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2	0	10-09-2007	Update for version 2 of the graphical user interface of the L2 OS operational processor	
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Page #	Section #	Comments
Version 1.0 to version 1.1		
	1.4, 1.5 and 1.6	Remove list of reference documents, list of applicable documents and list of acronyms and add a reference to Software Release Document.
	2	New section with an general introduction of the prototype processor environment. Numbering of existing section 2, 3, etc, shifts.
	6.2	Table 1 Updated according to IODD changes.
	6.3	Table 2 updated according to IODD changes
	6.4	Table 3 updated according to IODD changes
	6.5	Table 4 updated according to IODD changes
	6.6	Table 5 updated according to IODD changes
	3.2	Updated section
	Figures	Updated figures
	8.2.5	Updated section
	8.2.6	New section on access to visualization tools
	Appendix A	Updated section
	Appendix B	New appendix with software problem report / change request form.
	Appendix C	Formerly Appendix B. Updated with new list (ls –lR) of files on DVD.
Version 1.1 to version 2.0		
		Document reference name changed. Formerly SO-L2-SSS-ACR-012.
	All	Delete word “prototype”
	1.4, 1.5, 1.6	Update reference to new version of Software Release Document.

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Page #	Section #	Comments
	2.1	Update figure 1
	2.1 and 2.4	Visualization tool is not available in this version of the GUI.
	3.1	Update installation instructions
	3.2	Updated file tree description
	3.3	Updated processor and GUI dependencies
	6 and 7	Sections swap. Job handling comes before configuration description.
	6.	Section updated for modified job configuration panel.
	7	Section modified according to the new configuration file. Configuration files of the prototype are merged into the AUX_CNFOS2 file. New section for the job order file.
	8	GUI configuration file example updated.
	Appendix C	Appendix C with list of break points removed. List of available break point is given through the break point list of the GUI. See section 6.2.3.
Version 2.0 to version 2.1		
	3.1	Update installation instructions
	9	New section: tutorial for open prototype modification
	7.2	Configuration file description updated
Version 2.1 to version 2.2		
	6.2.4	Update of the break point interface
	6.2.3	Configuration file edition updated
	1.2	Clarification. Correct references.
	2.1	Correct references. Figure 2.1 updated
	2.2, 2.3, 2.4	Minor updated and clarifications
	3	Section renamed
	3.1	New section for operational processor installation.
	3.2	Installation procedure updated
	3.4.1, 3.4.2	Minor updates
	6.2.5	Generation of the list of grid points is clarified.
	7.2.1 to 7.2.5	Tables revised for consistency with the interface.
	Appendix 3	Appendix added with processor error codes
	6.1	Check on processor binary presence added with error message
	3.2	Check on processor soft links to products and libraries presence on GUI startup added with error message
	3.2	GUI installation procedure migrated to Open prototype SRD
	6.2.7, 6.2.8	Figures updated.
	7.4	New section addressing the private configuration file.
	4.1.1.1	Clean function clarified.
	4.1.2	Refer to section 6.2.7 for the behavior of the GUI when closed.
	6.1	Clarification on copies of configurable files
	9	Tutorial updated

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Page #	Section #	Comments
Version 2.2 to version 2.3		
	All	Update of the L2OS processor version to be 2.3. Minor updates.
Version 2.3 to version 2.4		
all	all	Reformatted header/footer & title pages for ARGANS
	7.2.1	retrievalMode redefined
	all	Changed references from AUX_CNFOS2 to AUX_CNFOSD/F
	all	Updated graphics & images from latest GUI version
	Table 7	Added List_of_Params
	Table 3	Added Tg_gal_noise_pol_max, Tg_WS_gal, Tm_gal_noise_pol, Tg_Acard_max, Tg_Acard_min, Tg_sigma_Acard_max

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1. Introduction

1.1 General

This document is the user manual of the SMOS L2 OS Prototype Processor and its Graphical User Interface (GUI).

Both the prototype processor and the GUI have been developed to be operated on Linux 64 bit platforms. They are two independent software packages. The processor can be operated from the command line interface, provided the configuration of the processor is valid. Configuration of the software includes many files, switches, selectors and parameters. The GUI helps the user to set up configuration files and to operate the processor. The GUI gives access to basic visualization tools for the output products as well.

1.2 Guide to this document

The user manual of the processor is embedded in the manual for the GUI since advanced users, who might use the processor without the GUI, will focus on the description of the configuration files in section 7.
For detailed information on the processor, numerous documents are released along with the software:

- For scientific aspects of the SMOS L2 OS processing, see the Algorithm Theoretical Baseline Document [R.D. 1].
- For inputs and output data, including the configuration files, see the Input / Output Data Description Document [R.D. 16], the SMOS L1 auxiliary data specification format [R.D. 13].
- For details on the data processing, see the Data Processing Model [R.D. 3].
- For details on the material released along with the processor, see [R.D. 11].

1.3 Structure of the Document

This document is organised to describe the GUI tool use, element by element, where the identified elements are:

- Section 2 , 3 and 4: Operational environment : installation, resources, overview of the main windows
- Section 5 : Folder handling
- Section 7: Database handling
- Section 8 : Jobs handling

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1.4 Applicable Documents

The list of applicable documents is available in the Software Release Document SO-RN-ARG-GS-0019 version 1.8.

1.5 Reference Documents

The list of reference documents is available in the Software Release Document SO-RN-ARG-GS-0019 version 1.8.

1.6 Abbreviations

The list of acronyms is available in the Software Release Document SO-RN-ARG-GS-0019 version 1.8.

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2 Overview

2.1 Introduction

Although the L2 OS processor can be operated in batch mode, the software is released with a Graphical User Interfaces (GUI) that simplifies its use. Figure 1 shows an overview of the processor and its environment.
Main functionalities of the GUI are:

- Configuration of the processor with access to all processor configuration files (see [R.D. 16]).
- Management of processor runs (scheduler, log, progress, pause, stop).

The GUI gathers all the functionalities sketched by the three boxes in light blue of Figure 1. Visualization of products can be done using SMOSview. The breakpoint report files in HDF5 format can by visualized with hdfview, which software can be launched from the GUI.

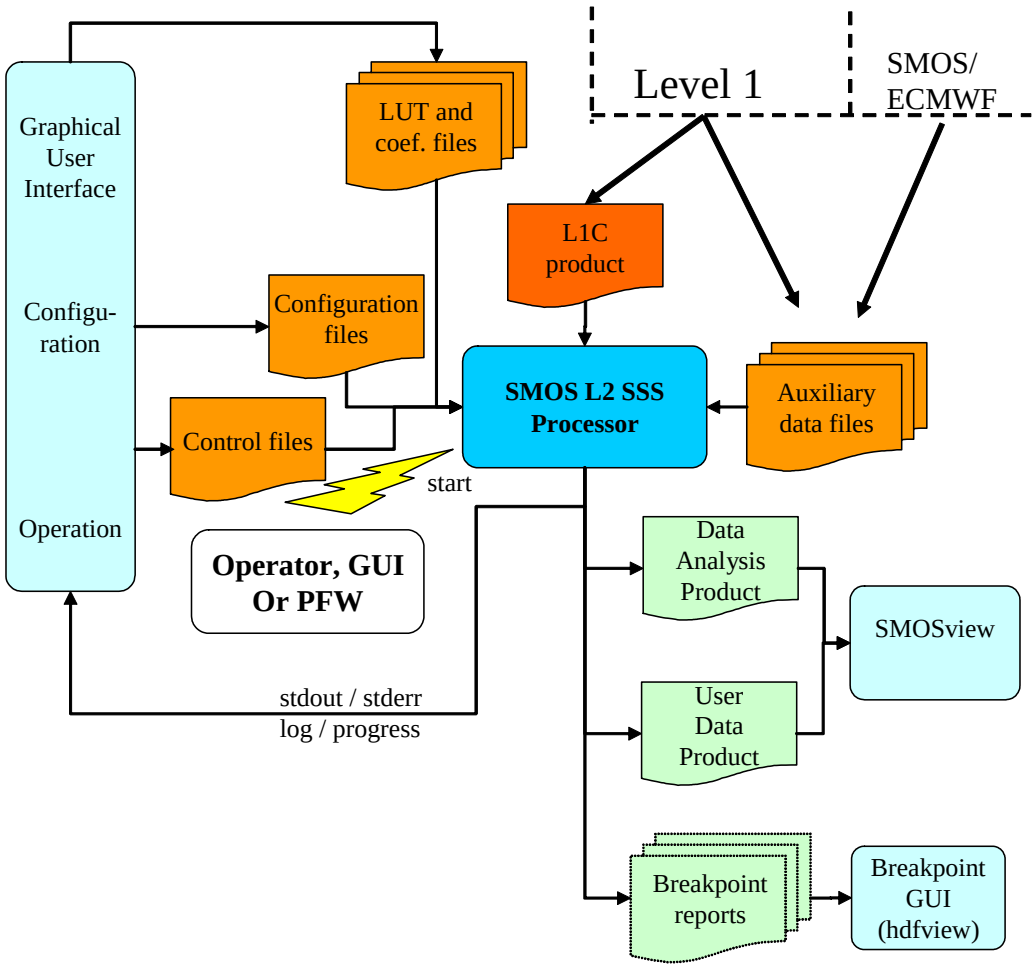

Figure 1: Overview of the SMOS L2 SSS processor, files and graphical user interfaces.

2.2 GUI: configuration functionalities

The configuration GUI generates configuration files (see section 2.5 of [R.D. 16]). With this graphical interface, the user can, among many other functions,

- Define names of input files and output files.
- Define processor operation mode (correction, retrieval mode, roughness model)

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- Select geophysical parameters to be adjusted during iterative retrieval and its operating mode (dual polarisation, full polarisation or Stokes 1)
- Select a processing latitude/longitude window where SSS is retrieved.
- Select grid points where SSS is retrieved.
- Sets thresholds for sea ice detection, Sun glint contribution, and measurement validity control.
- Activate breakpoints.

To some extent, the configuration interface gives access to LUT and coefficient files (see section 2.4 of [R.D. 16]). For example, coefficients of the roughness model 3 (ICM) can be modified through this interface.

2.3 GUI: Processor Operation

The operation GUI can start the processor with selected configurations. Processor runs can be scheduled, queued, paused, resumed and cancelled. Information generated by the processor on standard output (stdout) or on standard error output (stderr) is available through this interface. The interface monitors processing progress and reports status of past processor runs.

2.4 Data GUI

SMOS products can be visualized using SMOSview.

2.5 Breakpoint report GUI

The breakpoint report GUI is either a text editor of HDFview if the breakpoint reports are in text or HDF5 format.

Any prototype processor modification induces breakpoint report modification and therefore an update of the breakpoint report GUI. The data GUI shall be updated whenever one of the data products it deals with is modified. During SMOS life, it is anticipated that processor modifications will be more frequent than product format modifications. Therefore, it is expected that the breakpoint reports files will change frequently with regard to their content (add or remove variables). The viewer does not require any modification to give access to the data in the reports if the content of the breakpoint report file is modified.

2.6 File management

The processor uses and produces several files. Some of them are reused for many processor runs and/or shared by many users. Sharing input files reduces data volumes but has some limitation. For instance, if an input file is modified while the file is used as input to the current computations, the prototype processor may produce unexpected results.

For file sharing between users, standard access rights by users and groups of LINUX operating system are used.

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3 Installations and operation

3.1 Installation of the core processor

To install, to test and to use the processor from source codes, follow the procedure in section 4.1 of SO-RN-ARG-GS-0019.

3.2 Installation of the GUI

The SMOS L2 processor and its GUI are delivered as several compressed archive files along with installation instructions. Both software packages are intended to be installed on a Linux 64 bit operating system environment. The Red Hat 4 Enterprise operating system is recommended because it is the environment on which the processor and the GUI have been implemented and tested.

For the installation procedure of the GUI, refer to the SMOS L2 OS Prototype Processor Software Release Document SO-RN-ARG-GS-0022.

We assume hereafter that the processor and all necessary auxiliary and input data files have already been installed and that an environment variable SMOS_ROOT has been set, pointing to the installation directory and that the GUI components have been correctly installed and configured.

3.3 Installation of HDFview

HDFview is needed to visualize breakpoint report files. Installation of the software is detailed in the Prototype Processor Software Release Document SO-RN-ARG-GS-0022.

The HDFview can be directly launched using the GUI. To point on the installed version or any other previously installed version modify the corresponding global configuration parameter (see section 8).

3.4 GUI startup

The GUI is launched by typing the following commands:

```
cd $SMOS_ROOT/smos_GUI_SSScore
./launch_smos.sh
```

At launch time, verification is done for the presence of the ‘smos’ and ‘libpackages’ soft links (described in the Prototype Processor Software Release Document SO-RN-ARG-GS-0022). The following error message is displayed in case one of the links is not present in the GUI installation directory:

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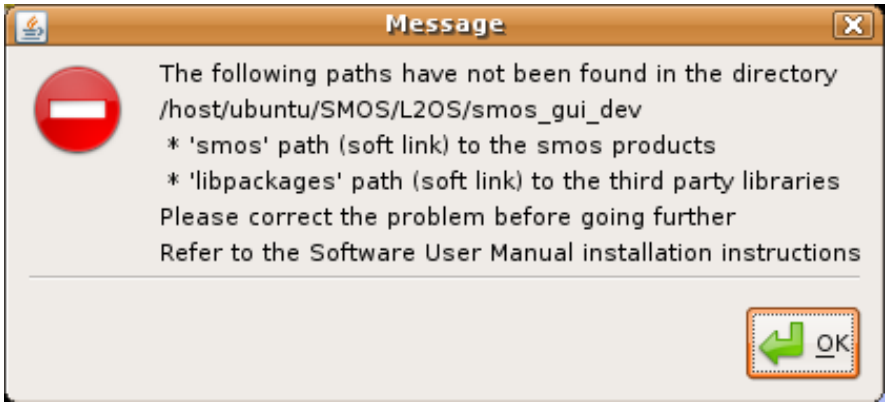
Message
The following paths have not been found in the directory
/host/ubuntu/SMOS/L2OS/smos_gui_dev
* 'smos' path (soft link) to the smos products
* 'libpackages' path (soft link) to the third party libraries
Please correct the problem before going further
Refer to the Software User Manual installation instructions
OK

Important note: The GUI contains environment variables that are set during the first launch of the interface. Once the package is installed it is preferable not to move the directory structure to another location but to perform a new install instead.

3.5 Testing the installation

The GUI is delivered with three jobs in order to test the installation. Before running the jobs, make sure to complete the installation procedure detailed in SO-RN-ARG-GS-0022.

Refer to section 6.2.1 to complete the tests.

3.6 Tree organization

After installation, the following file/directory structures will be accessible.

Type	Files	Path
GUI	Libraries	*$SMOS_ROOT/smos_GUI_SSScore*/lib and *$SMOS_ROOT/smos_GUI_SSScore*/gui/jars
	Java runtime environment	*$SMOS_ROOT/smos_GUI_SSScore*/jre1.6.0_01
	Configuration files	*$SMOS_ROOT/smos_GUI_SSScore*/properties
	Images	*$SMOS_ROOT/smos_GUI_SSScore*/gifs
	User manual (this document)	*$SMOS_ROOT/smos_GUI_SSScore/doc*
Processor	Binary executable	*$SMOS_ROOT/smos_GUI_SSScore*/bin
	HDFview installation package	*$SMOS_ROOT/smos_GUI_SSScore*/bin/hdfview_install_linux64amd_vm.bin
	Input configuration files	*$SMOS_ROOT/smos_GUI_SSScore*/inputs
	Processor data and schema	*$SMOS_ROOT/smos_GUI_SSScore*/smos (soft link)
	Processor libraries	*$SMOS_ROOT/smos_GUI_SSScore/libpackage (soft link)*
	Shell files	*$SMOS_ROOT/smos_GUI_SSScore*/shells
	Temporary spaces	*$SMOS_ROOT/smos_GUI_SSScore*/tmp and $*SMOS_ROOT/smos_GUI_SSScore*/pids[1]
Jobs	Global workspace	*$SMOS_ROOT/smos_GUI_SSScore*/folders/
	Folders	*$SMOS_ROOT/smos_GUI_SSScore*/folders/folder#M
	Job workspace	*$SMOS_ROOT/smos_GUI_SSScore*/folders/folder#M/SMOS_Job#N

[1] These directories should be manually cleaned. They are not used by the processor but by the GUI.

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	Input data	*$SMOS_ROOT/smos_GUI_SSScore*/folders/folder#M/SMOS_Job#N/Inputs
	Results of the run	*$SMOS_ROOT/smos_GUI_SSScore*/folders/folder#M/SMOS_Job#N/Outputs
	Control of processing	*$SMOS_ROOT/smos_GUI_SSScore*/folders/folder#M/SMOS_Job#N/Control

Note: The above temporary spaces are not used for the Core processor. These spaces are used by the GUI to store shell scripts and files needed to manage the processing.

In order to run correctly, SMOS GUI needs the following hardware and software resources:

3.6.1 Hardware and software requirements

Hardware and software requirements are detailed in the SMOS L2 OS Prototype Processor Software Release Document SO-RN-ARG-GS-0022.

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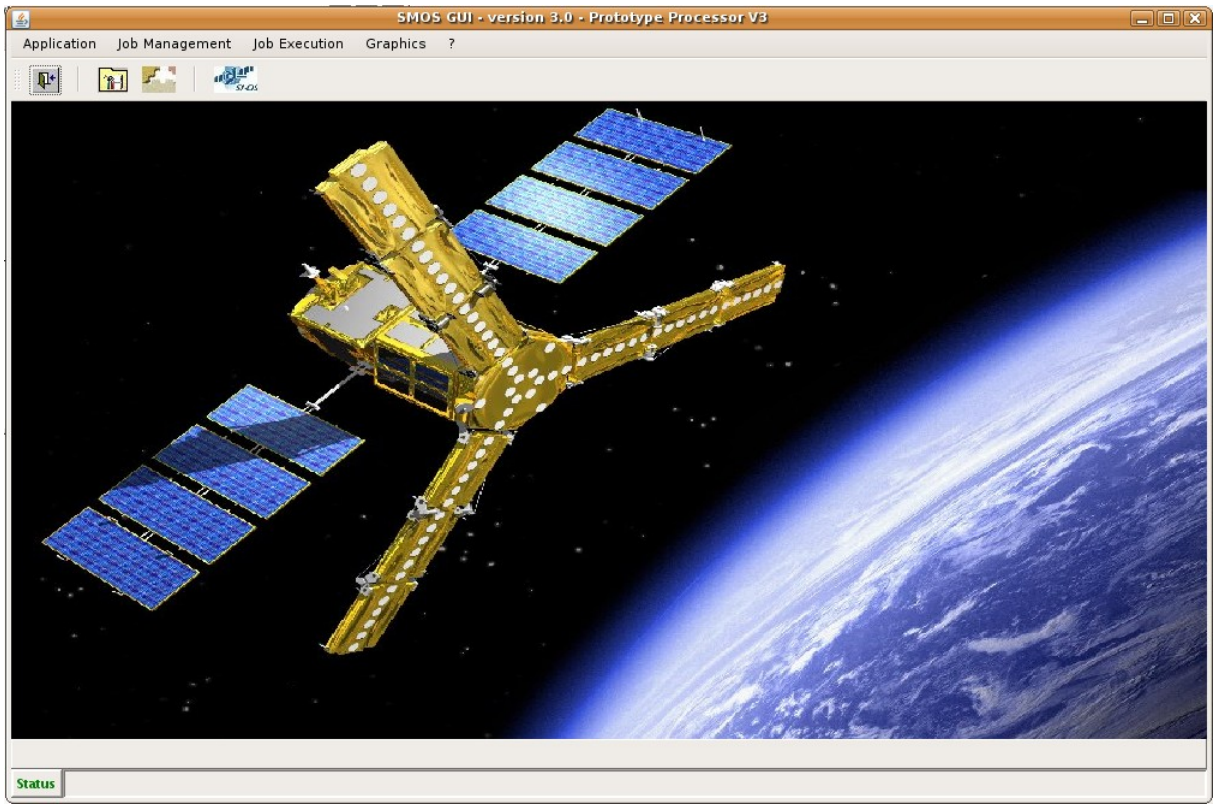
4 The graphical User Interface

4.1 The main windows

At launch time, as the GUI is loading, the next window is displayed.

Then the main SMOS Interface appears.



4.1.1 User Interface principles

SMOS GUI is dedicated to run SMOS Processor. All the functions are accessible from the main window menu which is split in 3 main functionalities:

- **Application**: to access the global parameter configuration window and the exit function
- **Job Management**: create or manage folders and jobs, configure and run jobs.

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- **Job Execution**: launch the job viewers : monitor running or scheduled jobs, check pas jobs
- **Graphics**: to access shortcut to HDFview
- **?**: access the user manual (this document in PDF format) and GUI current version (about function)

4.1.1.1 Job management

Job/Folder Management pull-down menu

In order to create, open, manage the jobs the user has to click on the top icon or to select "Job Management->Jobs" in the main window pull-down menu.. The following window appears containing all the functions necessary to navigate in the folders, to select, open, create, change comment or rename a job.

Note: It is not allowed to create a job if no folder exists

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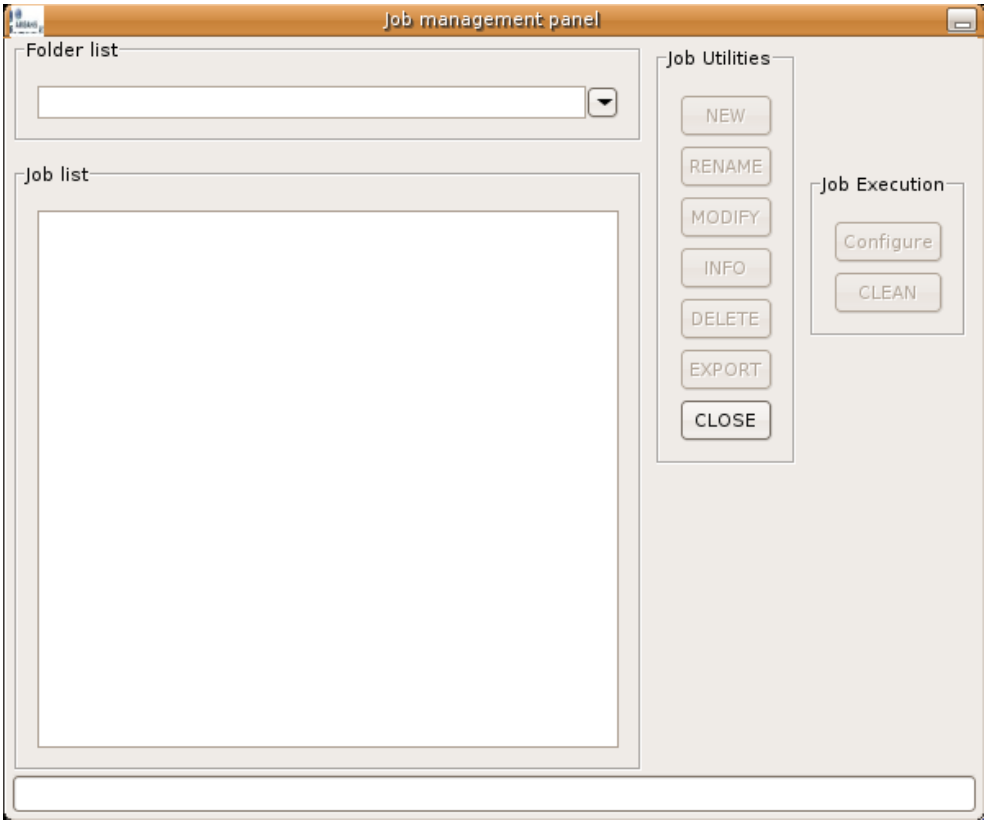

Job Management Panel

The list of existing jobs is displayed depending on the selected folder. The creation date and the status of execution are also written in this list.

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This panel gives access to the following functions:

Zone	Name	Function
Job Utilities	New	Create a new job from scratch or based on an existing job
	Rename	Rename the selected job
	Modify	Allow adding or modifying the job author and the job comment
	Info	Display all job information
	Delete	Delete the selected job
	Export	Make a compressed archive file with the whole job tree structure
	Close	Close the panel
Job Execution	Configure	Allows to configure and run the job (if not running)
	Clean	This function is used only if the GUI or the computer crashes for any reason (human, bug, …) while a job is running. At recovery time the interface will not be able to modify the status of the running jobs (if any) that will remain 'running' and when running, the configuration of a job cannot be accessed, so the job will remain inaccessible forever. The only way to enter the configuration again is to clean the status of the job and bring it back to 'New'

4.1.1.2 Folder management

Each job is stored in a folder. In order to **open**, create, and manage the folders the user has to click on the top Icon or to select “Folders” in the Job Management pull-down menu. The following window appears containing all the functions necessary to list the existing folders, to select, create, change comment or rename a folder.

It allows the user to create a new folder where to organize the storage of all the simulations.

Note: The number of jobs contained in each folder is displayed along with the creation date in the folder list zone.

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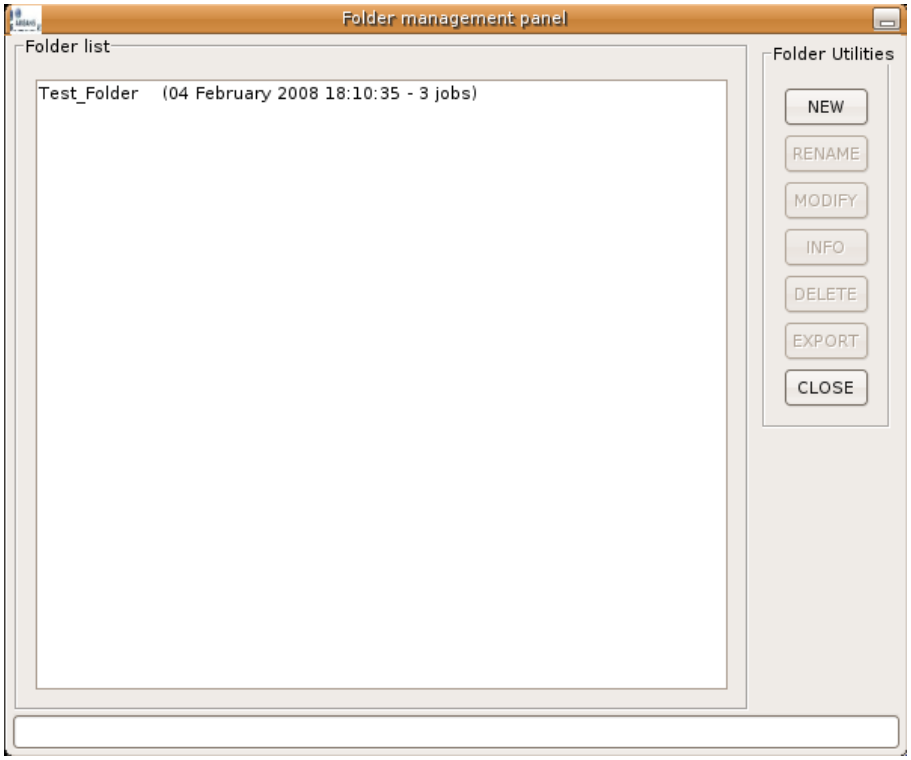

This panel gives access to the following functions:

Zone	Name	Function
Folder Utilities	New	Create a new folder
	Rename	Rename the selected folder
	Modify	Allow adding or modifying the folder author and the folder comment
	Info	Display all folder information
	Delete	Delete the selected folder
	Export	Make a compressed archive file with the whole folder tree structure
	Close	Close the panel

4.1.2 Exiting SMOS GUI

In order to quit the SMOS GUI, the user must select the “Exit” item in the “Application” pull-down menu.

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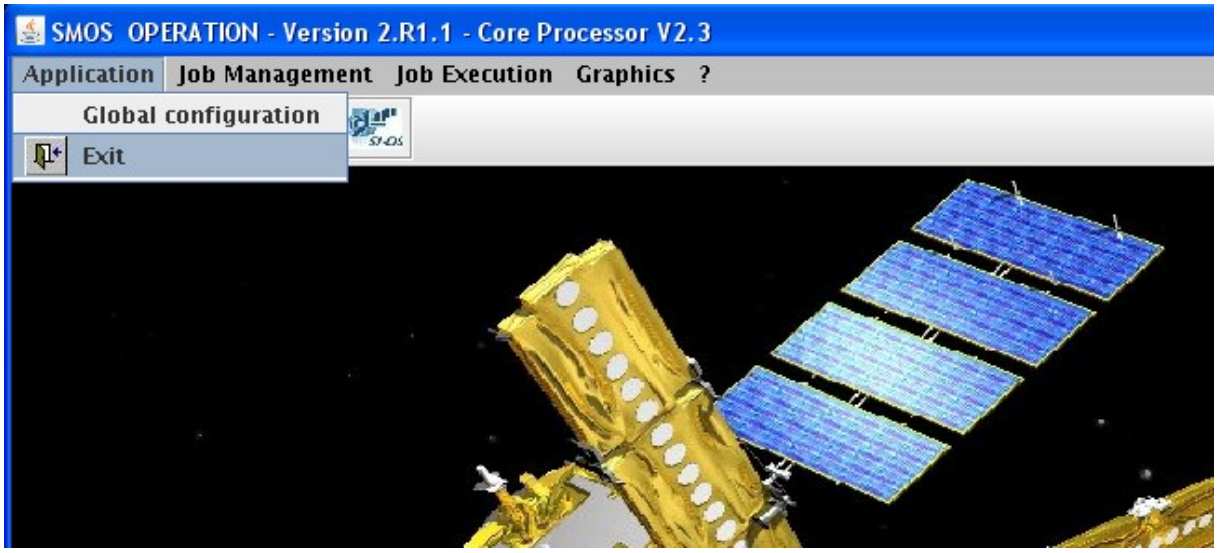
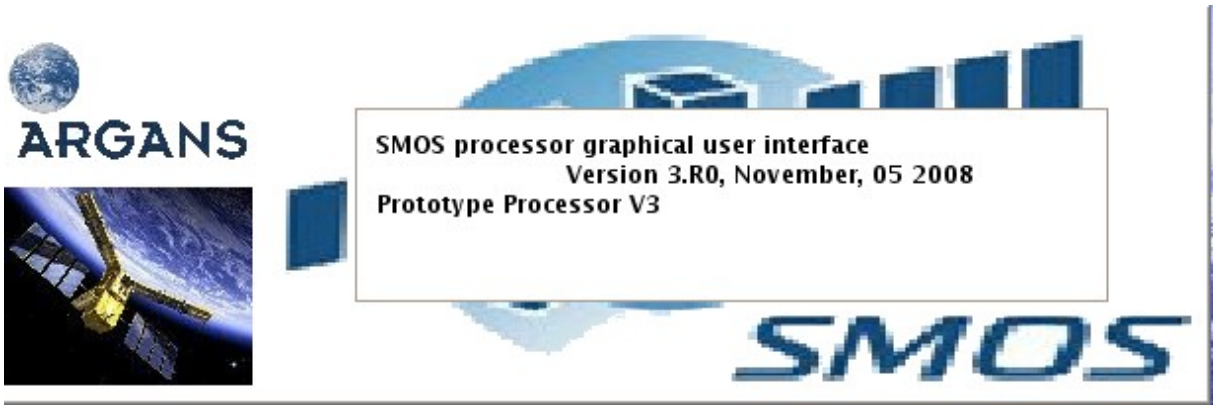


"Application" pull-down menu

Warning: All running jobs will be deleted at exit time. Details on interface behaviour regarding programmed jobs is given in section 6.2.7.

4.1.3 Version

From the main window, the pull down menu ? -> About provides the main references of SMOS GUI (click anywhere in the displayed window to close it)



"About SMOS GUI interface" window

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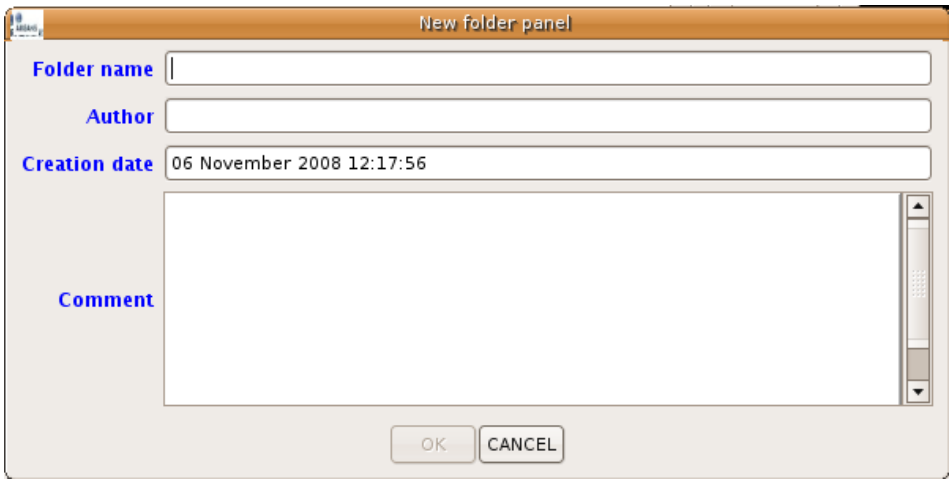
5 FOLDER HANDLING

In the folder panel, all the folders already existing are listed with details on the author, the creation date, and appropriate comments.

5.1 Create a new folder

The button "New" allows to open a window in which the user will specify the folder name (blank characters are allowed but will be replaced by underscores "_"), the author name (optional) and appropriate comments (optional).

***Note**: Special characters such as $, #, @, … are not allowed in the folder names*

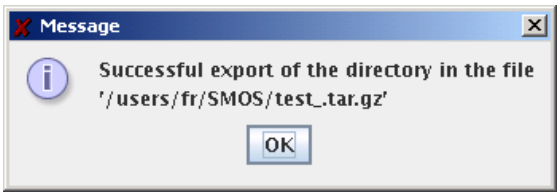


Create a new Folder

5.2 Manage the created folders

Renaming, modifying author or comment and getting folder info are achieved through the use of a panel identical to the one for folder creation.

The folder export button opens a navigation window that allows the user to select the destination of the exported file. A process is launched that creates a unique file named as the folder with the extension .tar.gz that is copied into the destination directory selected by the user. The following message is displayed when the copy is over.



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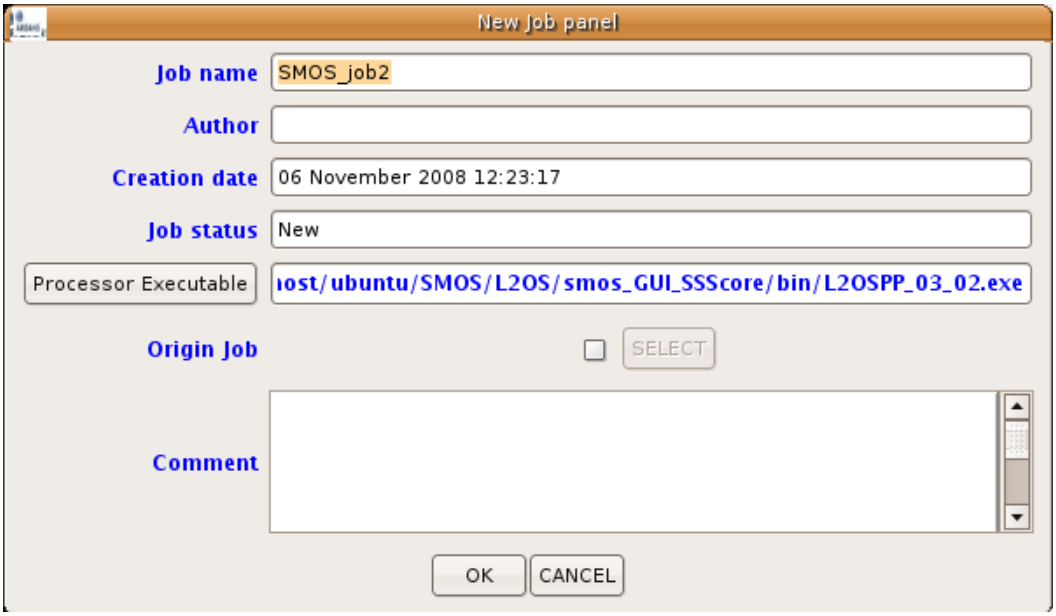
6 JOBS HANDLING

A complete run of SMOS prototype will be achieved after a full configuration of the job.

6.1 Job creation

From the job creation window, the button "New" opens a window in which the user will specify the job name (blank characters are allowed but will be replaced by underscores "_"), the author name (optional) and appropriate comments (optional). The processor executable binary can also be changed on this panel. Click on 'Processor Executable' button, a selection window will be displayed listing every L20SPP_* files contained in the bin/ directory. The user is invited to select the desired binary for the concerned job (any location is allowed). By default, the binary is set in the global configuration window – see section 8).



The option "Origin job" is provided in order for the user to be able to base the new job on a former one.

In order to use this option, it is necessary to click on the check box aside the "Select" button which is then enabled. By clicking on the "Select" button, the following panel is displayed which allows to select a job in a specific folder (see next image).

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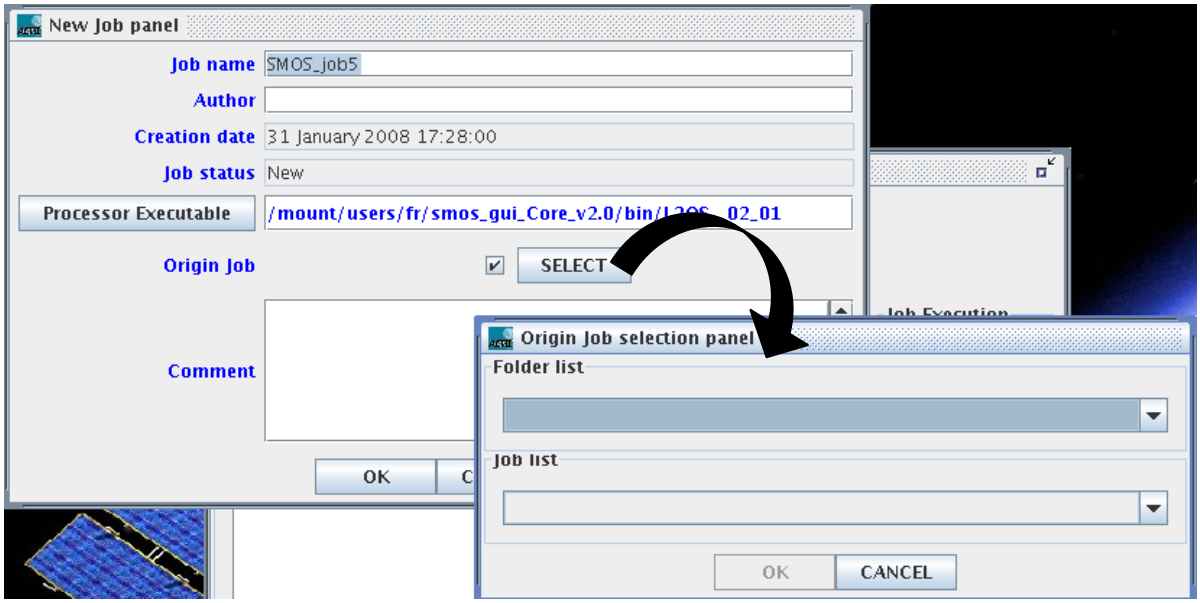
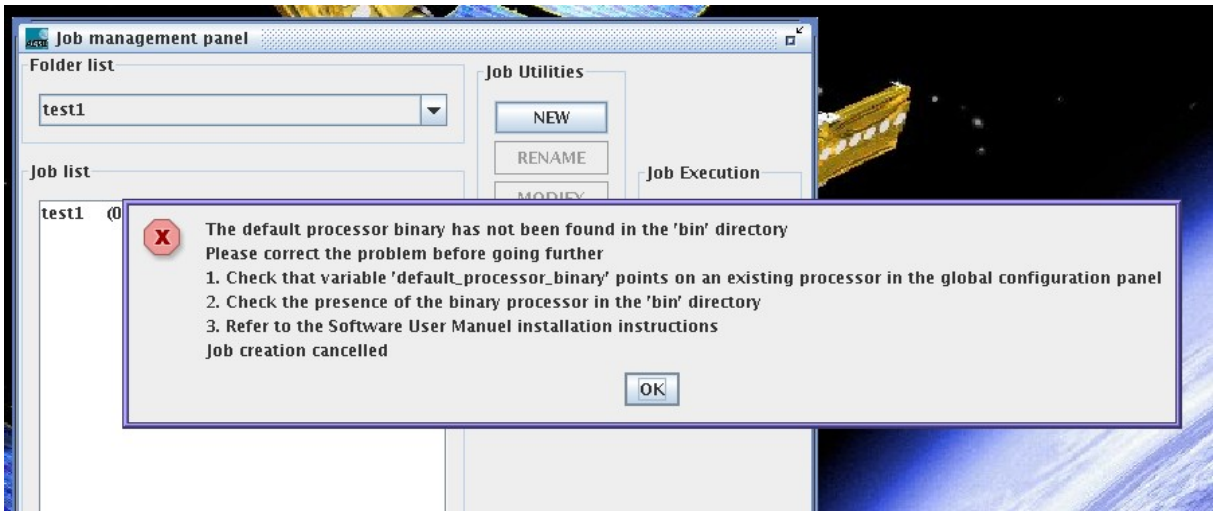


Note : It is important to ensure that the job selected as origin is compatible with the processor version used for the new job.

In case the default processor binary cannot be found in the 'bin' directory of the GUI, the following message is displayed along with possible recovery action to undertake.


Job management panel
Folder list
test1
Job Utilities
NEW
RENAME
Job list
Job Execution
The default processor binary has not been found in the 'bin' directory
Please correct the problem before going further
1. Check that variable 'default_processor_binary' points on an existing processor in the global configuration panel
2. Check the presence of the binary processor in the 'bin' directory
3. Refer to the Software User Manuel installation instructions
Job creation cancelled
OK

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If selected, the whole configuration of the selected former job will be copied into the new one instead of the one defined as the default dataset in the global configuration panel (see section 8).

GUI comes with a subset of the SSS database containing all the EEF files (XML format) and the Job Order. These files can be edited and modified by the user through the GUI XML editor tool in order to set their own configurations. To keep a stable reference, files are copied into the job/Inputs directory at creation time. All other files are defined through the job order, as these are binary files they are not duplicated into the job workspace.

Reference names of the files copied by the Graphical User Interface are:

- AUX_ATMOS_
- AUX_CNFOSD
- AUX_CNFOSF
- AUX_FLTSEA
- AUX_RGHNS3
- AUX_TIME__
- CNF_L2OS__
- MPL_JOBORD

6.2 Job configuration

After the job creation, from the job creation window, select the newly created job in the proposed list and click on the button “Configure” in the Job Execution zone. The following window appears.

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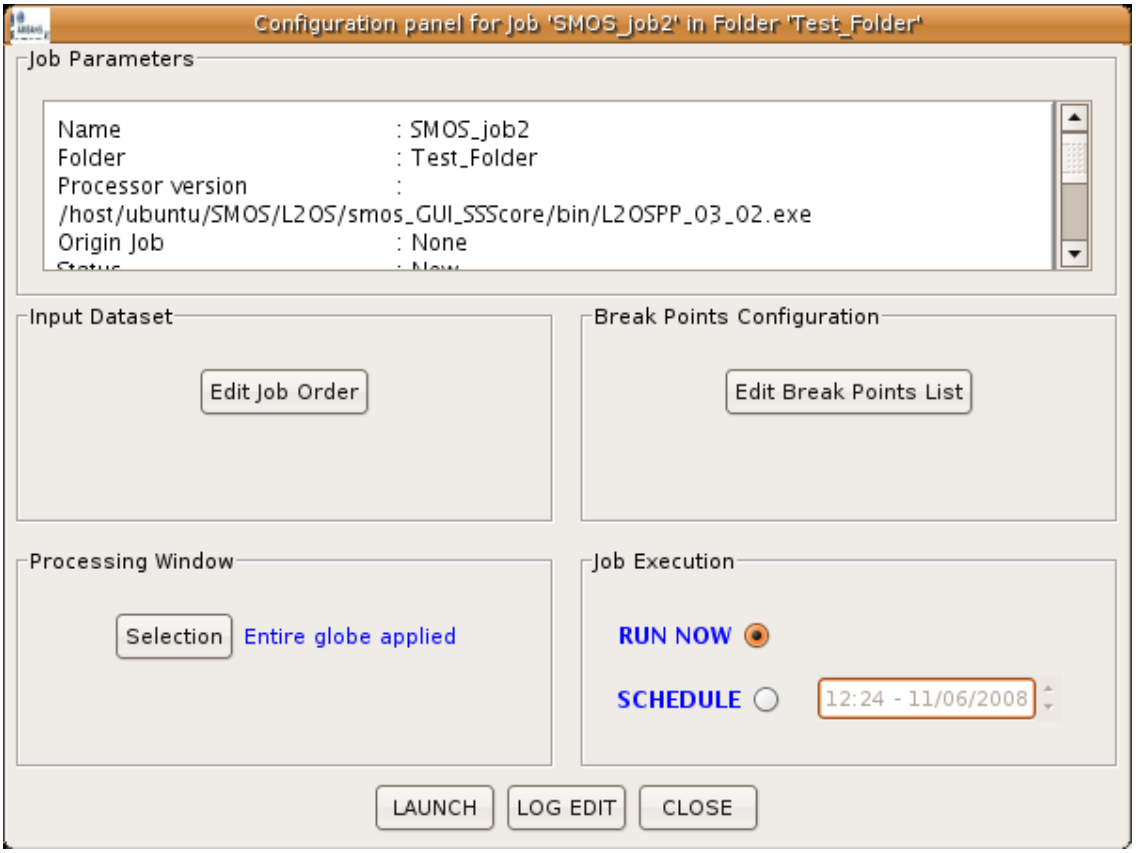

Job Configuration Panel

Four zones are displayed:

1. Input dataset
2. Break Points Configuration
3. Processing Window
4. Job execution

6.2.1 GUI testing

To launch the tests, select folder ‘Test_Folder’ in the ‘Job management panel’, then select one of the three jobs:

- dual_pol_test_job
- full_pol_test_job
- mire_test_job

Click on button ‘Configure’ in the ‘Job management panel’.

To run the selected test, click on button ‘LAUNCH’ in the ‘Job configuration panel’.

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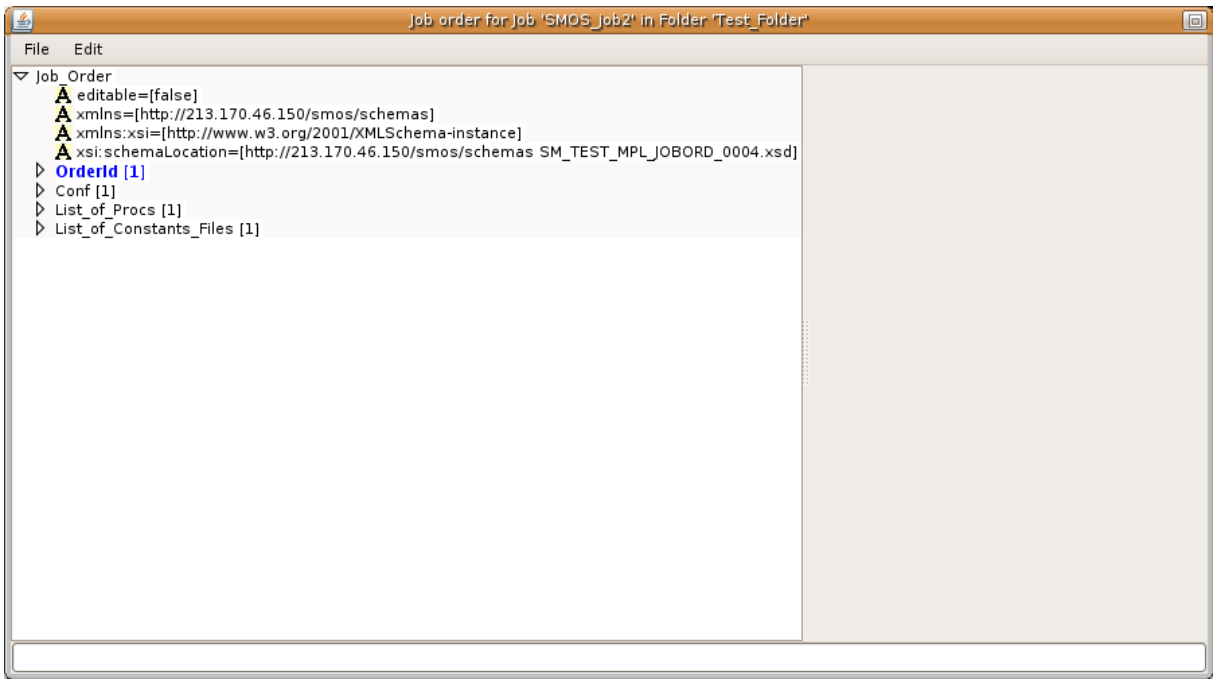
6.2.2 Edit Job Order

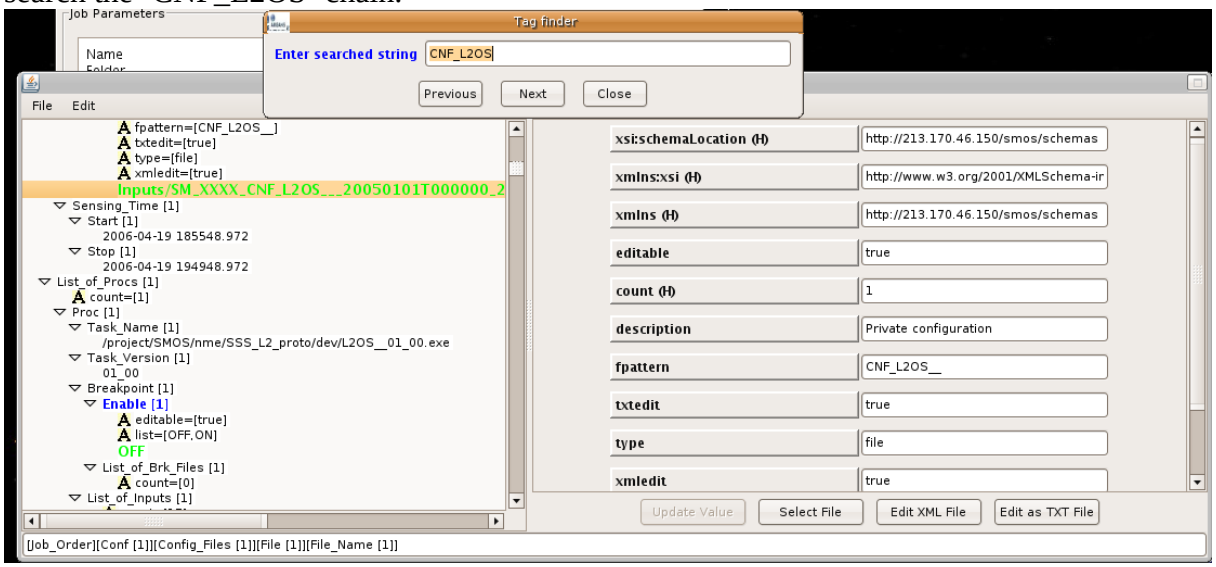
This button gives access to the job order file (MPL_JOBORD) file. It opens the XML file through the XML editor tool (see annexe A).



The job order file lists all input and output file names of the processor.

6.2.3 Edit private configuration file

Access to the private configuration file is via the job order file. Use the 'find string' feature to search the 'CNF_L2OS' chain.



Then click on a 'Edit XML file' button to display the file through the XML editor or in a text editor using 'Edit TXT file'.
A complete definition of the private configuration file is given in [A.D.2]

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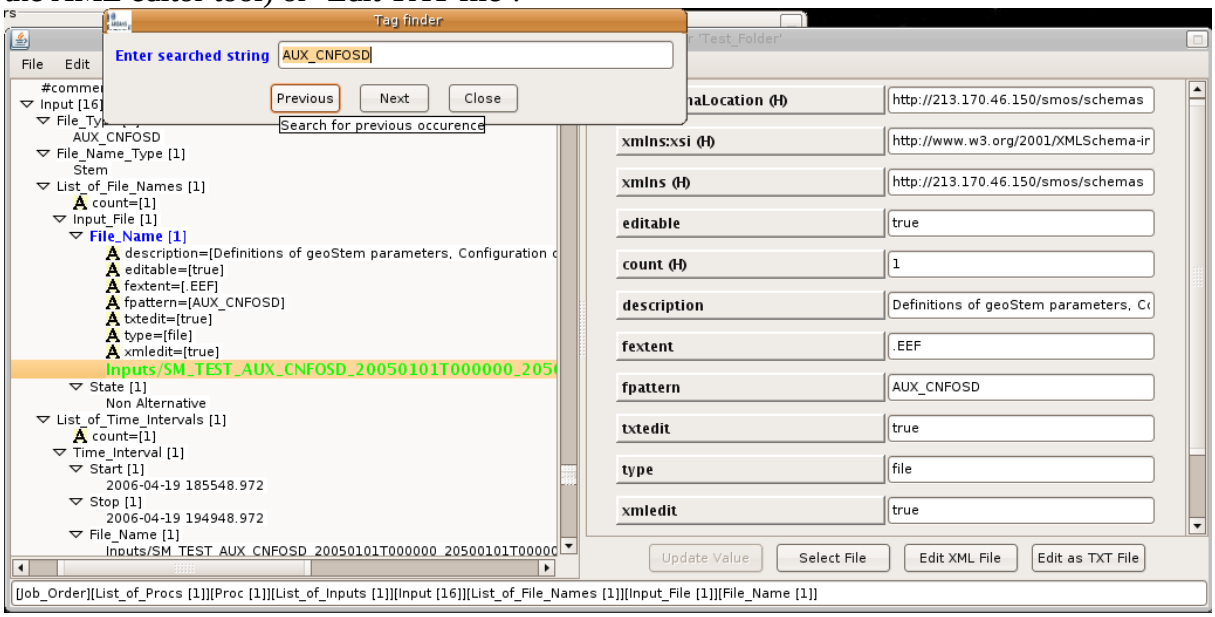
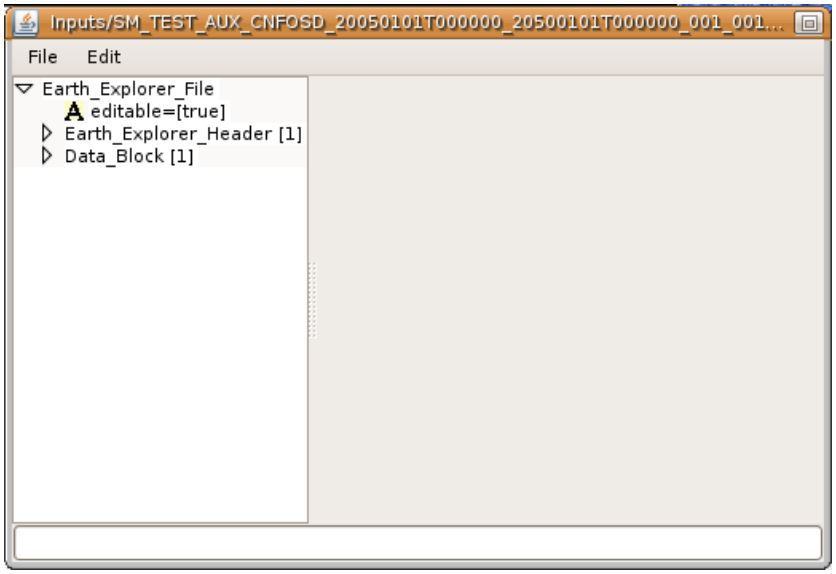
6.2.4 Edit auxiliary configuration file

To access this file, a procedure identical to the above for the private configuration file must be followed. 'Find string' must locate the 'AUX_CNFOSD/F' chain (note that the correct AUX_CNFOS file type should be selected to match the L1c input file type: D = dual polarisation, F = full polarisation). Then click on 'Edit XML file' button (see annexe A to use the XML editor tool) or 'Edit TXT file'.





All configuration parameters are listed in section 7.

6.2.5 Edit Break Points list

This button gives access to the break points management panel. It allows activating break points defined in the DPM [R.D. 3]. Break points are places in the processing where some of the local variables are copied in a file for detailed investigation. Data storage format is either HDF5 or text files. The user must be aware that break point activation slows down the processing and might generate very large data file. It is strongly recommended to limit the processing to 1 to 10 ISEA grid points when break points are in use.

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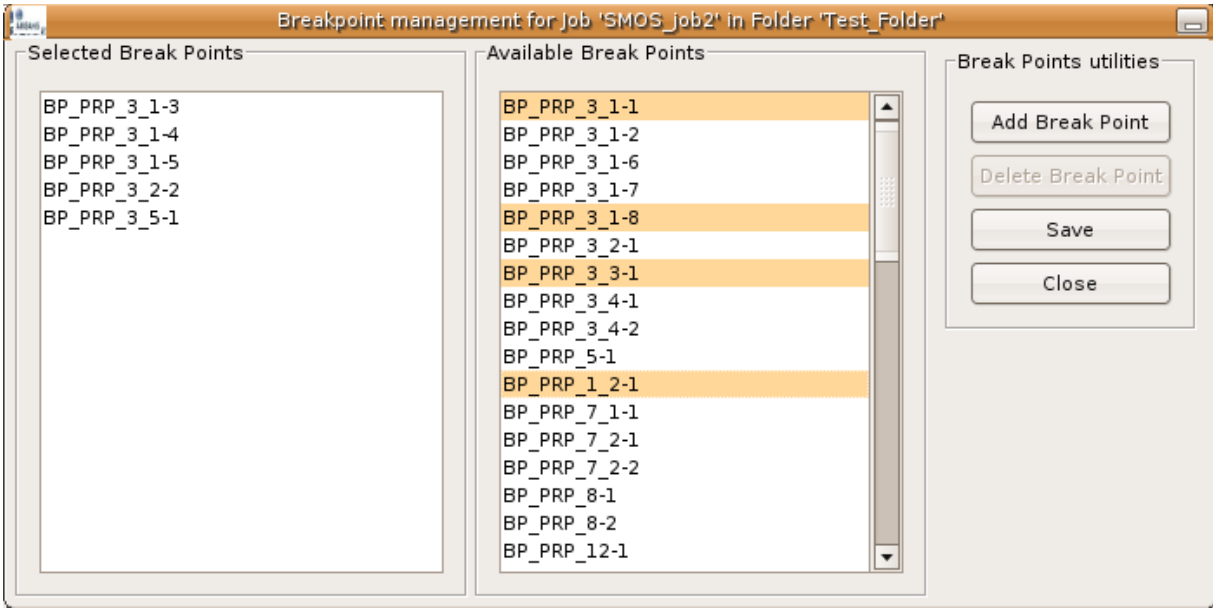

Breakpoint management: multiple breakpoints can be selected (by holding 'shift' or 'alt' key).

The list of available break points is located in the centre of the panel. Upon the users needs and according to the DPM, one or several break points are selected from the available list. To select multiple breakpoints, the User has to hold the 'shift' or the 'alt' key. Then, the break points can be added to the list of selected break points pushing the "Add Break Point" button. Other break points can be added to the list of selected break points following the same procedure. Break point can be removed from the list of selected break point by selecting them (multiple selection is also allowed) and pushing the "Delete Break Point" button. Once the list of selected break points is complete, it shall be saved pushing the "Save" button.
To confirm the break point system activation, the "Breakpoint / Enable" tag of the Job Order shall be set to "ON". See section 6.2.2 to edit the job order.
The data file in HDF format generated by the break point will be available in the "Outputs" directory of the job directory. The file name is the name of the break point. It is editable through the HDFview software.

6.2.6 Processing window selection

This button allows entering a processing window limits manually or on a world map. The following window is displayed:

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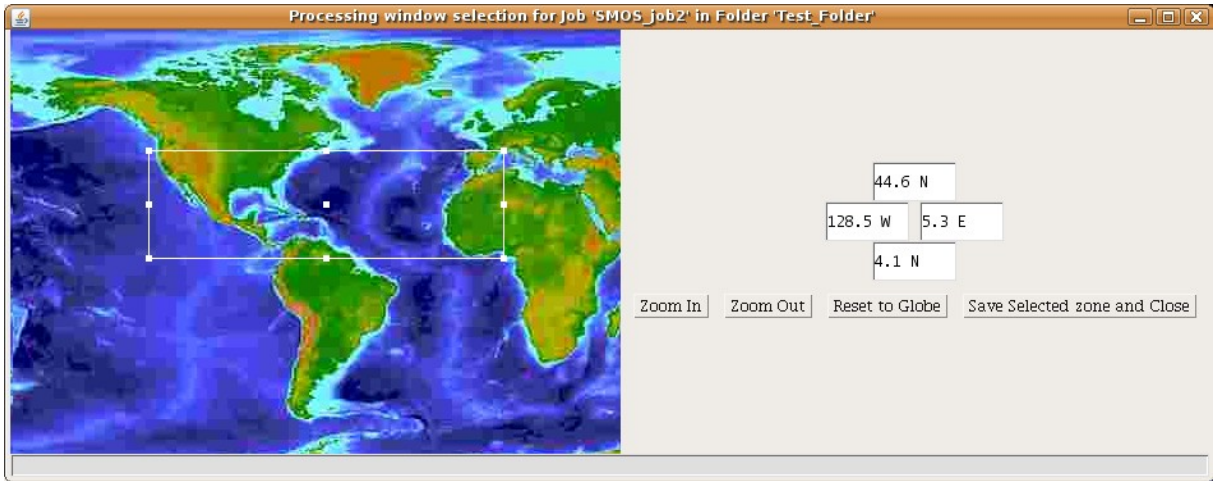


The user is invited to select a rectangular area by dragging the mouse over the map or by entering the latitude/longitude numerical values directly in the corresponding boxes. Once the zone is selected, a click on the button named 'Save selected zone and Close' will modify the private configuration file (pointed to in the Job Order) according to the entered values.
The job configuration panel will display a message:

- Zone selected (in green color)
- Or Entire globe applied (in blue color) if no processing window is selected

The limits of the selected zone can be checked by editing the private configuration file (see section 6.2.3). The limits are also written in the job configuration panel (Job parameters scrollable text area).

6.2.7 Job execution

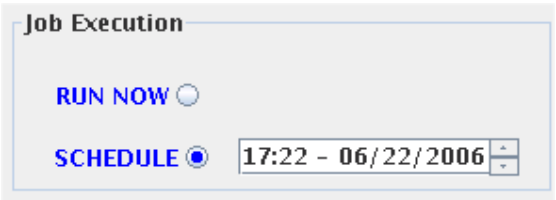
Once the configuration phase is over, the processor is ready to be launched. Two different running modes are available:

1. Direct launch
2. Scheduled launch

The direct launch mode is used by selecting the 'Run now' option. Clicking on the button 'Launch' will run the job:

- If no job is already running, the job is launched
- If a job is already running, then the job will be launched only if the maximum number of allowed concurrent jobs is set to an appropriate value (e.g. greater than 1). Otherwise, the job will be queued until it is possible to be run.

The scheduled mode is used when the 'Schedule' option is selected. The user is invited to enter the date and time of run in the format : hh:mm – mm/dd/yyyy



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It is possible to replace numbers in the date zone or by positioning the mouse cursor in the zone to be modified and by clicking on the up/down arrow menu, by this way, numbers will increase one by one. Clicking on the button 'Launch' will schedule the job:

- If the scheduling date is passed, the user will be warned and invited to modify his selection

- Else the job is scheduled

When exited or crashed, the interface behaves differently according to running or programmed jobs. The following situations (alone or mixed) can be met before crash:

1. One or several jobs were running (or paused)
2. One or several jobs were scheduled
3. One or several jobs were queued

When the interface is exited:

- running jobs are deleted.
- queued jobs are queued again when interface is launched
- scheduled jobs are scheduled again only if scheduling time is not passed.

6.2.8 Job monitoring

Two monitoring tools are proposed to follow or analyse the job runs.

1. The job control panel
2. the past jobs control panel

The job control panel is used to monitor alive runs. This means that all the running, scheduled, or queued jobs can be monitored through this functionality.

When selecting 'Job Control Panel' from the main window pull-down menu, the following window appears (only if containing a job):

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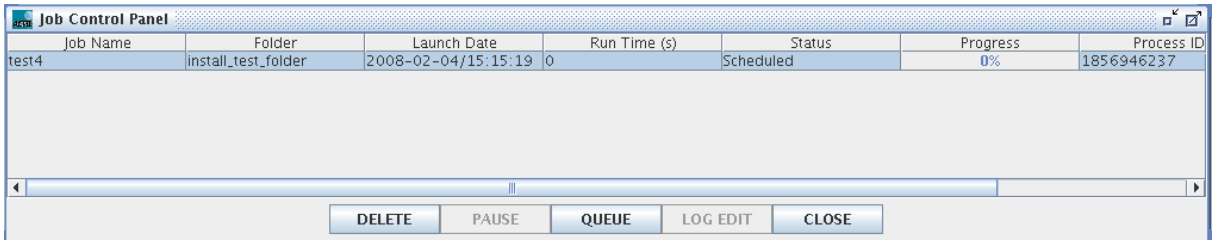
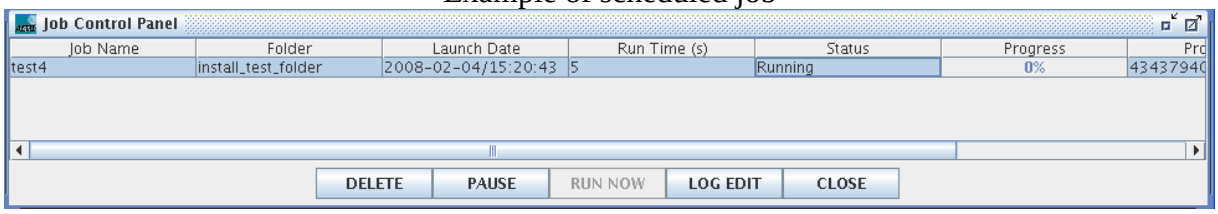
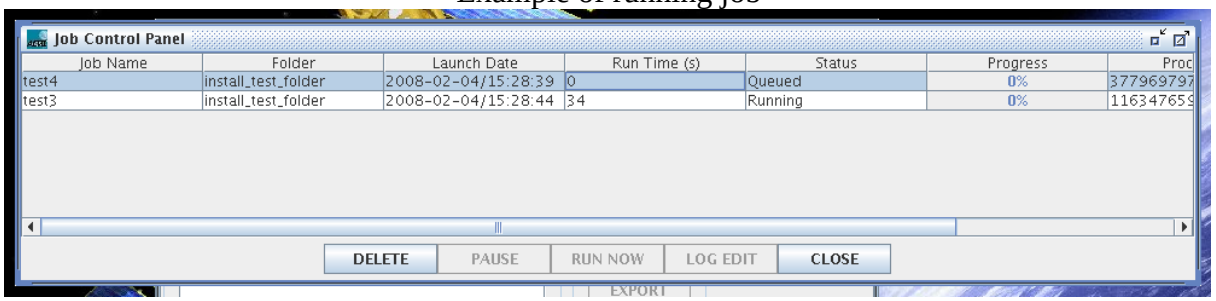


Example of scheduled job



Example of running job



Example of queued job

Each line of the list is dedicated to a job. It allows to check the progress of the run through the 'Run time' given in seconds and the 'Progress' given in percentage.
It is also possible to edit the output log file of any running job and monitor the progression of the computation.
As shown in the above snapshots, the names and availability of the buttons displayed in this window depend (and may vary) according to the type of job selected:

- On a running job the user can:
  - Pause (then Resume) it
  - Delete it
  - Edit the log file (in real-time)

- On a scheduled job it is allowed to:
  - Queue it (equivalent to run it immediately if no other job is already running according to the maximum number of possible concurrent jobs)
  - Delete it

- A queued job can only be deleted. The launching is automatic when it is detected to be possible.

The past job control panel gives access to formerly run jobs. It allows editing the log files. A delete button is available to erase the jobs from the list (multiple selection is possible). The deletion bears only on the list. The jobs are not physically erased from the simulator.

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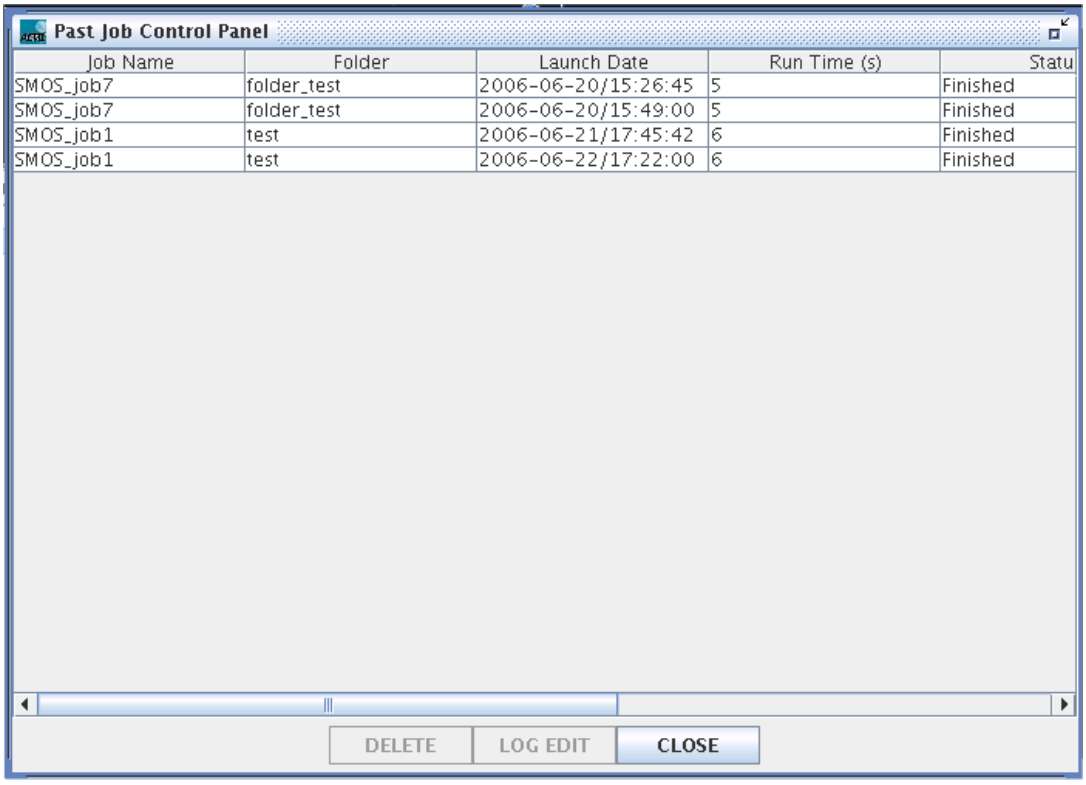
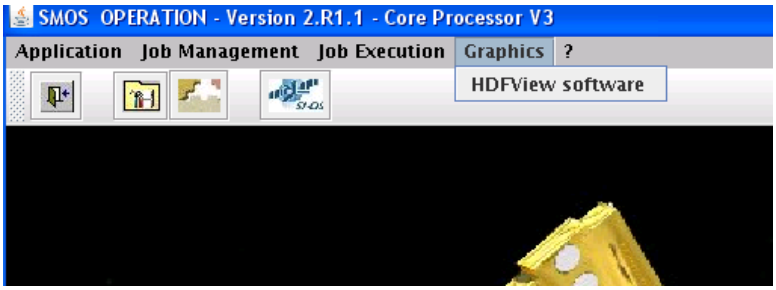


6.2.9 Graphical software



The interface presents a shortcut command in order to launch HDFview to edit HDF breakpoint report files

The commands are defined through the XML editor of the global configuration panel (see section 8)

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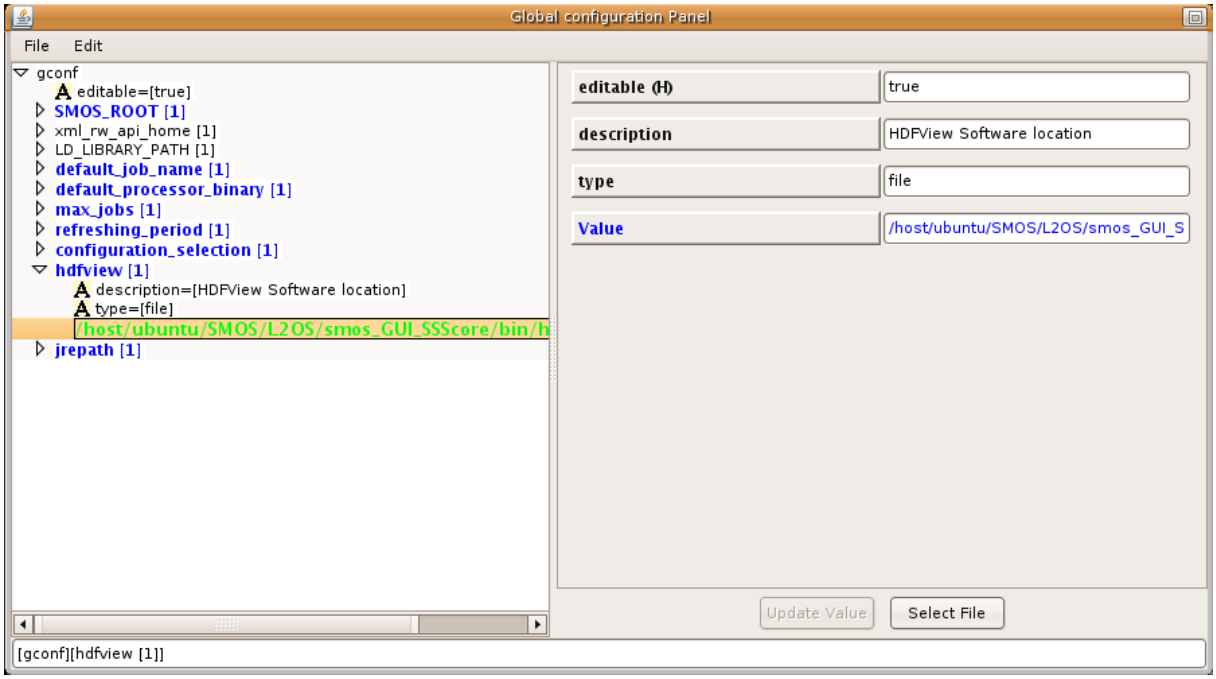

Global configuration panel: setting HDFview binary location

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7 CONFIGURATION FILES

7.1 Introduction

The SMOS L2 SSS processor handles many files that are either input files or output files. Input files are loaded in the processor. They include either data or configuration information. This section addresses the later group of files, listed below:

- Main configuration file, which includes
  - Private configuration file
  - Iterative scheme configuration file
  - User selection of grid points
  - Geophysical parameter definition file
  - Threshold file
  - Post Processor configuration file
- Job order

A technical description of the content of all files handled by the prototype processor is available in [R.D. 4] or [R.D. 16]. In this section, the configuration parameters are detailed and their role in the processing is addressed. It is assumed that the user has basic knowledge of the MIRAS instrument and of the SSS retrieval algorithm (see [R.D. 1]).
This document is aimed at giving the user key information on the processor configuration. Format of the files is not addressed here (all configuration files are in XML) and header structures defined for files of an Earth Explorer mission are out of the scope of this document.
All XML tags documented in the next sections are under the “Data_Block” tag.
Descriptions given below are also available in the Graphical User Interface.
Tags that contain only other tags (sons) are in yellow. The tag name is repeated after the last tag contained by the father.

7.2 The main configuration file

The main configuration file is referenced with “AUX_CNFOSD/F” in its filename. It contains most of the configuration data of the processor. Tables in next subsections give details on the file content. In these tables, items highlighted in yellow are tags. With the interface, items highlighted in green can be edited and their content is detailed in the next sections.

7.2.1 The iterative scheme configuration

The iterative scheme configuration includes key information for the iterative scheme, e.g. selection of forward model or maximum number of iterations. All the data are repeated three times because up to three SSS retrievals are attempted per grid point. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Iterative_Scheme tags.

Tag	Description	Note
List_of_Iterconf	Tag: container of the four configurations	
Iterative_Conf	Iterative scheme configuration (1/4)	
nRetrievedParam	Number of retrieved parameters	1 to 10
List_of_retrived_Parameters	List of retrievedParamId tags	Fill as much tags in the list as the number of retrieved parameters

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Tag	Description	Note
retrievedParamId	Name of 1st retrieved parameter	SSS, SST, UN10, VN10, tec, WSn, phi_wsn, HS, MSQS, omega, UST.
retrievedParamId	Name of 2sd retrieved parameter	
retrievedParamId	Name of 3rd retrieved parameter	
retrievedParamId	Name of 4th retrieved parameter	
retrievedParamId	Name of 5th retrieved parameter	
retrievedParamId	Name of 6th retrieved parameter	
retrievedParamId	Name of 7th retrieved parameter	
retrievedParamId	Name of 8th retrieved parameter	
retrievedParamId	Name of 9th retrieved parameter	
retrievedParamId	Name of 10th retrieved parameter	
sig_th_mod	Uncertainty of the forward model in H polarisation at target level	Accounted for in the cost function and in outlier detection
sig_tv_mod	Uncertainty of the forward model in V polarisation at target level	
sig_st3_mod	Uncertainty of the forward model – Stokes 3 at target level	
sig_st4_mod	Uncertainty of the forward model – Stokes 4 at target level	
KappaDia	Factor for multiplying Marquardt diagonal	
lamdaini	Initial value of the Marquardt diagonal amplifier	
deltasig	Increment to standard ratio for convergence	
deltaChi	Cost function variation for convergence	
fCon	Maximum of conditioning factor	
List_of_Delta_Parameters	List of deltaP tags	
deltaP	Variation of the 1st retrieved parameter to compute derivative	
deltaP	Variation of the 2sd retrieved parameter to compute derivative	
deltaP	Variation of the 3rd retrieved parameter to compute derivative	
deltaP	Variation of the 4th retrieved parameter to compute derivative	
deltaP	Variation of the 5th retrieved parameter to compute derivative	
deltaP	Variation of the 6th retrieved parameter to compute derivative	
deltaP	Variation of the 7th retrieved parameter to compute derivative	
deltaP	Variation of the 8th retrieved parameter to compute derivative	
deltaP	Variation of the 9th retrieved	

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Tag	Description	Note
	parameter to compute derivative	
deltaP	Variation of the 10th retrieved parameter to compute derivative	
itMax	Maximum number of iteration	
lamdaMax	Maximum of Marquardt diagonal amplifier	
Tg_num_meas_min	Minimum number of measurements to start the retrieval	
Switch_foam	Compute foam coverage of contribution	
RetrievalMode	Select between five retrieval modes	0 = full polarisation; 1 = dual polarisation from dual; 2 = dual polarisation from full; 3 = Stokes 1 from dual; 4 = Stokes 1 from full strategy 1; 5 = Stokes 1 from full strategy 2; 6 = Stokes 1 from full strategy 3
Switch_gal	Model for galactic noise contribution	0 = Model 0 1 = Model 1 2 = Model 2
Switch_roug	Model for sea surface roughness effects	0 = None 1 = model 1 from IPSL/LOCEAN 2 = model 2 from IFREMER 3 = model 3 from ICM-CSIC
Switch_rough3	Sea surface model 3 selector for coefficients	Valid if switch_roug = 3. For ICM-CSIC only.
Switch_retr	Not used.	
Switch_card	Activate cardioid model instead of flat sea model.	
Switch_err_mod	Account for model error if true.	
Delta_sn	Maximum admissible time between two measurement to compute Stokes 1	Valid if retrievalMode = 2.
Tg_WS_roughness	Wind speed above which roughness contributions are computed.	
Tg_WS_foam	Wind speed above which foam contributions are computed.	
List_of_Guess_Datas	List of guess_prior tags	
guess_prior	Use First guess for the 1st retrieved	

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Tag	Description	Note
	parameter	
guess_prior	Use First guess for the 2sd retrieved parameter	
guess_prior	Use First guess for the 3rd retrieved parameter	
guess_prior	Use First guess for the 4th retrieved parameter	
guess_prior	Use First guess for the 5th retrieved parameter	
guess_prior	Use First guess for the 6th retrieved parameter	
guess_prior	Use First guess for the 7th retrieved parameter	
guess_prior	Use First guess for the 8th retrieved parameter	
guess_prior	Use First guess for the 9th retrieved parameter	
guess_prior	Use First guess for the 10th retrieved parameter	
Iterative_Conf	Close container	
Iterative_Conf	Iterative scheme configuration (2/4)	
Repeat tags above		
Iterative_Conf	Close container	
Iterative_Conf	Iterative scheme configuration (3/4)	
Repeat tags above		
Iterative_Conf	Close container	
Iterative_Conf	Iterative scheme configuration (4/4)	
Repeat tags above		
Iterative_Conf	Close container	
List_of_iterconf	Close container	

Table 1: Description of the iterative scheme configuration tags

7.2.2 The geophysical parameter definitions

The SMOS L2 SSS processor handles a list of geophysical parameters for which a detailed definition in needed. Each geophysical parameter is identified by a unique index. During the processing, whenever the processor needs a geophysical parameter value, the index is used to retrieve the value from the list of geophysical parameter values. The index is used to store the definition (name, unit, …) of the parameter as well. The geophysical parameter definition file provides the prototype processor with the definition of the geophysical parameter along with the indices. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Parameter_Index tags.

The data should not be modified by the user.

Tag	Description	Note

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Tag	Description	Note
List_of_definitions	Tag: container of the definitions of the geophysical parameters	
Geophy_Param	Definition of a geophysical parameter	
Ind_SST	Index of the Sea Surface Temperature parameter	Must be unique in the list of indices.
Name	Name of the geophysical parameter	
NameLong	Long name of the geophysical parameter	
unit	Unit of the geophysical parameter	
desc	Description of the geophysical parameter	
origin	Origin of the geophysical parameter	Optional
originID	Identifier of the origin of the geophysical parameter.	Not used
Geophy_Param	Close container	
Geophy_Param	Definition a geophysical parameter	
Ind_SSS	Index of the Sea Surface Salinity parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WS	Index of the Wind Speed parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WSn	Index of the neutral wind speed parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_phi_wsn	Index of the azimuth of neutral wind parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Tsea_air	Index of the air-sea temperature difference parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WFV	Index of the wind friction velocity parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_OMEGA	Index of the inverse wave age parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		

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Tag	Description	Note
Geophy_Param		
Geophy_Param		
Ind_HS	Index of the inverse wave height parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_MSQS	Index of the Mean Square Slope of Wave parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_TAU	Index of the optical thickness of the atmosphere parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_TatmEq	Index of the equivalent atmospheric temperature parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Tair	Index of the air temperature at 10 m parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_TCWV	Index of the total column water vapor content parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_tec	Index of the Total Electronic Content parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Tp	Index of the mean period of wind waves parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_U	Index of the wind friction velocity (from ECMWF atmospheric model) parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		

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Tag	Description	Note
Geophy_Param		
Geophy_Param		
Ind_Uwav	Index of the wind friction velocity (from ECMWF WAM wave model) parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_2mDT	Index of the dew point temperature at 2m parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Cd	Index of the drag coefficient with waves parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_phi_wind	Index of the azimuth of wind parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_SHWW	Index of the significant height of wind waves parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_SLP	Index of the sea level pressure parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_SP	Index of the surface pressure parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_UN10	Index of the neutral wind zonal component parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_VN10	Index of the neutral wind meridional component parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WSwav	Index of the wind speed from ECMWF	Must be unique

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Tag	Description	Note
	WAM wave model parameter	
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WS_U	Index of the wind zonal component parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_WS_V	Index of the wind meridional component parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_PP1D	Index of the peak period of 1D spectrum of waves parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Rain	Index of the total rain rate parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_ice_sea_conc	Index of the sea ice concentration parameter	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_UST	Index of the friction velocity from ECMWF	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_ZNT	Index of the roughness length from ECMWF atmospheric/surface model	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
Geophy_Param		
Ind_Acard	Index of the Acard coefficient of cardioid model	Must be unique
The tags *name*, *nameLong*, *unit*, *desc*, *origin*, *originId* are repeated here		
Geophy_Param		
List_of_definitions		

Table 2: Description of the geophysical parameter definition tags

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7.2.3 The thresholds

The SMOS L2 SSS processor performs many tests to check the retrieval conditions and to verify the usefulness of the data. Often, the tests are comparisons between measurements or geophysical parameter values on the one hand and thresholds on the other hand. The table below gathers all the thresholds needed by the processor. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Thresholds tags.

Tag	Description	Note
Switch_af	Only measurement in the alias free field of view are used	
nsig	Sigma number beyond which measurement becomes an outlier	
Tg_gal_noise_max	minimum % of measurements flagged for galactic noise to flag a grid point	
Tg_gal_noise_pol_max	Minimum % of measurements flagged for polarised galactic noise to flag a grid point	
Tg_WS_gal	WS below this threshold lead to the discarding of measurements contaminated by erroneous galactic noise	
Tg_high_SSS	Boundary between “medium SSS” and “high SSS”	
Tg_high_SST	Boundary between “medium SST” and “high SST”	
Tg_high_wind	Boundary between “medium wind” and “high wind”	
Tg_ice_concentration	Limit of ice concentration for retrieval execution	
Tg_low_SSS	Upper limit for very low SSS	
Tg_low_SST	Upper limit for very low SST	
Tg_low_SST_ice	Temperature under which ice could be present (Celsius)	
Tg_low_wind	Upper limit for low wind speed	
Tg_medium_SSS	Boundary between “low SSS” and “medium SSS”	
Tg_medium_SST	Boundary between “low SST” and “medium SST”	
Tg_medium_wind	Boundary between “low wind” and “medium wind”	
Tg_moonglint_max	minimum % of measurements flagged for moonglint to flag a grid point	
Tg_num_meas_valid	Threshold of number of valid measurements	
Tg_num_outliers_max	minimum % of outlier measurements to flag a grid point	
Tg_suspect_ice	Limit of measurement percentage for which presence of ice is suspected	
Tg_Sunglint_max	minimum % of measurements flagged for sunglint to flag a grid point	
Tg_max_rainfall	Limit of acceptable rain	
Tg_TEC_gradient	Threshold for TEC gradient	
Tg_lat_ice_Acard	Latitude min for ice detection from Acard model	
Tg_SST_ice_Acard	SST threshold for ice detection from Acard model	
Tg_Acard_ice	Acard threshold for ice detection	
Tm_angle_moon	Limit of acceptable angle between the specular direction and the moon direction.	
Tm_DT_ice	For testing if ice contaminates the brightness temperatures (Celsius)	

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Tag	Description	Note
Tm_high_gal_noise	High galactic noise boundary	
Tm_gal_noise_pol	High polarized galactic noise boundary	
Tm_high_sun_glint	Boundary between “medium sun glint” and “high sun glint”	
Tm_low_sun_glint	Upper limit for no sun glint	
Tm_Max_GN_Error	Limit of acceptable galactic background error	
Tm_medium_sun_glint	Boundary between “low sun glint” and “medium sun glint”	
Tm_out_of_range	Limit for TB out of range detection	
Tm_sun_limit	Limit of acceptable sun glint contribution	

Table 3: Description of the tags with the thresholds

7.2.4 Physical_constants

The SMOS L2 SSS processor uses several physical constants that are listed in the table below. The user should not change the values of these tags. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Physical_constants tags.

Tag	Description	Note
Freq_smos	Frequency of SMOS radiometer	
T0	Temperature at 0 Celsius degree	
epsilonInf	High frequency limit value of relative dielectric constant	
Epsilon0	Permitivity of free space	
Fac_omega	Omega fartor	
g	Acceleration of free fall	
Orbit_duration	Orbit duration	
Omega_sun	Apparent solid angle of the Sun at 1.4 Ghz seen from Earth	
Cst_far	Faraday Constant	
Ucard	U parameter of the cardioid model	
Bcard	B parameter of the cardioid model	
TB_gal_mean	Sky irradiance of galactic noise model 0	

Table 4: Description of the tags with the physical constants

7.2.5 The post-processor configuration file

Post processing in the frame of the SMOS L2 SSS processor includes the computation of indicators on the quality of the retrieval. For such computation, thresholds and weights are needed. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Post_processing tags.

Tag name	Description	Note
Tg_Chi2_P_max	Maximum admissible value for Dg_chi2_P	
Tg_Chi2_P_min	Minimum admissible value for Dg_chi2_P	
Tg_chi2	Threshold to set the quality flag of the retrieval process	

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Tg_sigma_max	Maximum SSS retrieved sigma acceptable	
Tg_SSS_max	Maximum salinity acceptable	
Tg_SSS_min	Minimum salinity acceptable	
dT_dS_0	Zero order sensitivity dS_dT	
dT_dS_1	First order sensitivity dS_dT	
Tg_Acard_max	Maximum value of valid retrieved Acard	
Tg_Acard_min	Minimum value of valid retrieved Acard	
Tg_sigma_Acard_max	Maximum value of sigma of valid retrieved Acard	
SC11	Scale factor for C(1) computation	
SC21	Scale factor for C(2) computation	
SC22	Scale factor for C(3) computation	
SC23	Scale factor for C(4) computation	
SC24	Scale factor for C(5) computation	
SC25	Scale factor for C(6) computation	
SC26	Scale factor for C(7) computation	
SC27	Scale factor for C(8) computation	
SC28	Scale factor for C(9) computation	
SC31	Scale factor for C(10) computation	
SC32	Scale factor for C(11) computation	
SC33	Scale factor for C(14) computation	
SC34	Scale factor for C(15) computation	
SC35	Scale factor for C(16) computation	
SC36	Scale factor for C(17) computation	
SC41	Scale factor for C(19) computation	
SC42	Scale factor for C(20) computation	
SC43	Scale factor for C(21) computation	
SC44	Scale factor for C(22) computation	
SC45	Scale factor for C(23) computation	
SC46	Scale factor for C(24) computation	
SC47	Scale factor for C(25) computation	
SC48	Scale factor for C(26) computation	
SC49	Scale factor for C(27) computation	
SC50	Scale factor for C(28) computation	
SC51	Scale factor for C(29) computation	
SC52	Scale factor for C(30) computation	
SC53	Scale factor for C(31) computation	
SC54	Scale factor for C(32) computation	
SC55	Scale factor for C(33) computation	
SC56	Scale factor for C(34) computation	
SC57	Scale factor for C(35) computation	

Table 5: Description of the post-processor configuration tags

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7.2.6 Overall_Quality_Thresholds

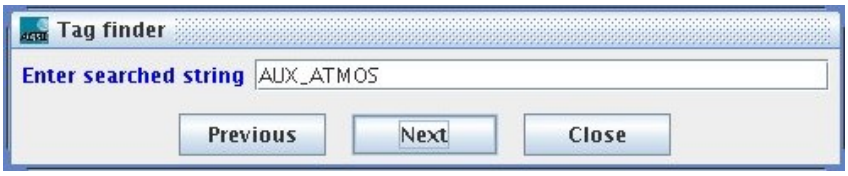
The SMOS L2 SSS processor estimates the overall quality of the output products. Thresholds are needed for that. All tags in the table below are under the Data_Block / L2_OS_Configuration_Parameters / Physical_constants tags.

Tag	Description	Note
Tg_Qual_Low_SSS	Below this threshold grid points are classified as low SSS	
Tg_Qual_High_SSS	Above this threshold grid points are classified as low SSS	
Tg_Qual_Low_SST	Below this threshold grid points are classified as low SST	
Tg_Qual_High_SST	Above this threshold grid points are classified as low SST	
Tg_Qual_Low_WS	Below this threshold grid points are classified as low WS	
Tg_Qual_High_WS	Above this threshold grid points are classified as low WS	

Table 6: Description of the overall quality threshold tags

7.3 Job order

The job order file (MPL_JOBORD) provides the processor with input and output file names. The simplest way to change the name of an input or output file is to find (using the 'FIND STRING' button) the "File_Name" tag of the file type the user want to modify.
For example, to select a new AUX_ATMOS file, push the button 'FIND STRING' and enter the file type, i.e. AUX_ATMOS.



Clicking 'enter' or 'Next' button will expand the xml tree of the job order file, highlight and select the File_Type tag that has "AUX_ATMOS" for value. The tag to be changed is the next File_Name tag, further down on the XML tree.

7.4 The private configuration file

The private configuration file (CNF_L2OS) is used to define system parameters. This file is in XML ASCII format.
Complete definition of the file name along with header and Data_Block tag fields are provided in [A.D.2].
The role of the private configuration file is to define:

1. State of so-called hidden switches that allows special operation modes of the prototype processor.
2. Versions of schemas to be used with input and output products
3. Processing window
4. List of grid points to be processed.

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Items 1, 3 and 4 are key configuration parameters for open prototype users.
If the number of grid points of the list of selected grid points (set with the count attribute of the tag List_of_grid_points) is not zero, it means that the processor will consider only the grid points with identifier listed in the list of grid point. If such list is defined, it takes precedence to the processing window, which is ignored. The L2 OS UDP and DAP product will contain only the grid point processed, whereas in the case of a full or window prong, all grid points of the L1c file with be present in the L2 products. Defining a short list of grid points is useful when breakpoint reports are activated and the processor is fast to produce small L2 products.
Processing window can be defined using the GUI. List of grid point can be set up by editing the private configuration file as a text file.

Tag name	Description	Note
Hidden_Switches	Tag start	
OverWriteMeasurement	Brightness tepmeratures of L1c file are patched with brighness temperatures computed for outlier detection. Gaussian noise is added to brightness temperaturetures according to either radiometric uncertainty or Stddev (see below) if Stddev>0.	
OverWritePior	Prior, after bias correction in AGDP module, are patched with random values with gaussian probability distribution function with mean = prior and standard deviation = uncertainty on prior.	
rescaleRadiometricUncertainty	Obsolete.	
Seed	Seed of the random number generator with gaussian probability distribution function. Seed is random if tag value is negative	
Mean	Mean bias to be added to brightness temperatures when patched.	
Stddev	Standard deviation of noise to be added to brightnes temperature when they are patched. Radiometric uncertainty of L1c product is used in stddev < 0.	
bypass_xml_rw_api	Input data reading is faster with this option.	
Supress_DAP	Do not generate DAP or DAP report	
Ignore_AGDP	Do not process AUX_AGDP	
Ignore_Pol_Gal_Noise	Do not process polarised galactic noise (ie ignore LUT_tQQ_00 & LUT_tUU_00 in AUX_GAL2OS)	
Hidden_Switches	Tag end	
List_of_Input_Schemas		
Schema	Repeated 20 times	
Product_Type	Product type name	
Schema_Version	Version of schema to be used with the version of the processor	
Schema	Tag end	
List_of_Input_Schemas	Tag end	
List_of_Output_Schemas		
Schema	Repeated 4 times for UDP, DAP, UDP report and DAP report	
Product_Type		
Schema_Version		

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Tag name	Description	Note
Schema	Tag end	
List_of_Output_Schemas	Tag end	
Processing_window	Limits in lat/lon of selected area	
Start_Lat	Latitude lower limit for area selection	
Start_Lon	Longitude lower limit for area selection	
End_Lat	Latitude upper limit for area selection	
End_Lon	Longitude upper limit for area selection	
Processing_window	Ending tag	
List_of_Grid_Points	Number of grid point to be processed. Tags below repeated Npl times. Npl given by “count” attribute	
GridPointID	Grid point ID.	
List_of_Grid_Points	Ending tag	
List_of_Params	Number of general purpose parameters. Tags below repeated Np times. Np given by “count” attribute. Placeholder field: default value 0.	
Param	Placeholder field: general purpose parameters, default value 0 if List_of_Params > 0	
List_of_Params	Ending tag	

Table 7: Description of tags of the private configuration file.

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8 CONFIGURATION OF THE GRAPHICAL USER INTERFACE

The SMOS GUI contains global parameters that can be configured through the internal XML editor tool (see image below).

The global configuration panel accesses the following parameters:

- SMOS_ROOT: At first launch of the GUI this variable is automatically set to the GUI install directory.
- xml_rw_api_home: Non editable variable. This variable is based on SMOS_ROOT one and is used to configure processor runs.
- LD_LIBRARY_PATH: Non editable variable. This variable is based on SMOS_ROOT one and is used to configure processor runs.
- Default job name: By default a unique name is given to a job created through the processor. This name is constituted with this root name and a counter number increasing as jobs are created.
- Default processor binary: When several versions are available, the creation panel will select this value by default. Default processor binary can be modified here.
- max_jobs: Several jobs can run at the same time. The number entered manually by the user should depend on the computer speed and available amount of RAM memory. This option should only be used if the computer has a multi-processor structure and has enough RAM memory to run several processing (*e.g.* 4 Gb x max_jobs).
- Refreshing_period: This period in seconds is used for updating the job progress information zone.
- Configuration_selection: A list of possible dataset is provided here. This list must correspond to dataset located into the 'SMOS_ROOT/inputs' directory. Each dataset should contain any files necessary to run the SMOS prototype processor. When a new job is created, all the files of the selected dataset are copied into the job workspace to be configured and used during the processor run (see section 6.1).
- hdfview: HDFview software location (default is SMOS_ROOT/bin/hdfview/hdfview). See HDFview install procedure in section 3.2).
- jrepath: Java Runtime Environment location.

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Description:

File : global_conf.xml

Type : XML

Path: SMOS_ROOT/properties

XML File structure:

```
<?xml version="1.0" encoding="ISO-8859-1" standalone="no" ?>
<gconf>
  <SMOS_ROOT type="dir" description="SMOS ROOT INSTALL DIRECTORY">/mount/users/L2OS/smos_gui_Core_v3.2</SMOS_ROOT>
  <xml_rw_api_home description="xml_rw_api_home" editable="false">${SMOS_ROOT}</xml_rw_api_home>
  <LD_LIBRARY_PATH description="LD_LIBRARY_PATH" editable="false">${SMOS_ROOT}/libpackages/proclogs:${SMOS_ROOT}/libpackages/l1pp/external_libs/lib64</LD_LIBRARY_PATH>
  <default_job_name description="Default Job Name">SMOS_job</default_job_name>
  <default_processor_binary description="Default Processor Binary Name" fpattern="L2OSPP_" type="file">/mount/users/L2OS/smos_gui_Core_v3.2/bin/L2OSPP_03_02</default_processor_binary>
  <max_jobs description="Maximimum number of jobs" editable="true" list="1,2" type="int">1</max_jobs>
  <refreshing_period description="Refreshing Period (s)" list="2,5,10,30" type="int" unit="s">2</refreshing_period>
  <configuration_selection description="Selection of the running configuration" listdir="L2OS/smos_gui_Core_v3.2/inputs">data_core_v4</configuration_selection>
  <hdfview description="HDFView Software location" type="file">L2OS/smos_gui_Core_v3.2/bin/hdfview/hdfview</hdfview>
  <jrepath description="Java Runtime Environment location" type="file">L2OS/smos_gui_Core_v3.2/jre1.6.0_01</jrepath>
</gconf>
```

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9 Modification of the L2OS open prototype: tutorial

9.1 Introduction

In this section, a tutorial details the procedure to modify the source code of the open prototype. It is assumed that the processor has been installed successfully (see section 3.1).

Users who want to modify the processor code will most likely change the brightness temperature model at the surface. This tutorial explain

1) how to insert user's model in the source code
2) how to retrieve geophysical parameters to feed the user's model
3) where to call the user's model
4) how to update the processor
5) how to use the user's forward model

Before any source code change, the user need to make sure that he/she has write permission on the source code files under the SMOS_ROOT/dev directory.

9.2 Insert a new user's model

In this tutorial, the user's model is very simple. It simulates a contribution to the surface brightness temperature in H and V polarisation directions due to roughness effect that is proportional to the wind speed WS.

TbH = TbV = 0.1 WS

To add this model to the global forward model used by the processor to compute brightness temperatures that are compared to the measurement, a new function is created in the SMOS_ROOT/dev/forward_model/forward_model.c function. The new function is inserted after line 87 (#include …) and before the function computeForwardModelContribution is defined. The new code lines are

```
int my_contribution(double ws, double my_TB[4]) {


  my_TB[0] = 0.1 * ws;
  my_TB[1] = 0.1 * ws;
  my_TB[2] = 0.0;
  my_TB[3] = 0.0;

  return(RETURN_CODE_SUCCESS);
}
```

The general forward model handles the four Stokes parameters at the surface (target) polarisation frame as well as at the antenna polarisation frame with a vector of four floating numbers:
Tb[0] = H or X polarisation (in K)
Tb[1] = V or Y polarisation (in K)

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Tb[2] = 2 Re(T_{HV}) or 2 Re(T_{XY})
Tb[3] = 2 Im(T_{HV}) or 2 Im(T_{XY})

In the proposed user's model, Stokes 3 and 4 parameters are set to zero.

9.3 Geophysical parameter retrieval from the data model of the processor

User's models are functions of geophysical parameters. In this tutorial, this is only wind speed. A collection of geophysical parameters are available to the users. Values at the target, including their evolutions, if any, along the iterative process, are retrieved from the processor data model with the following line of code to be inserted in the computeForwardModelContribution routine:

```
ws = measurementHandle->gridpoint->geophyParamValue[configHandle->index-
>ind_WS];
```

The list of geophysical parameters available this way is available in the DDD, with the description of the "param_index" structure in the file config_proto.h.

9.4 Where to call the user's model

The computeForwardModelContribution function calls many forward models. The user's model is called by this function. Since it is a new model for roughness contribution, a new case to the selector of roughness models is added to the `switch` function dealing with switch_roug selector

New code lines are:

```
case 4:
ws = measurementHandle->gridpoint->geophyParamValue[configHandle->index-
>ind_WS];
my_contribution(ws, tbRough);
break;
```

To update the processor, type the following command in the SMOS_ROOT/dev directory:

```
make
```

An updated version of the processor executable should be generated, although the name of the executable is the same. If compilation error occur, check the new code consistency and compile again ('make' command).

9.5 Testing the code modification

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To be able to test the newly created executable, the user must now copy it into the bin/ directory of the Graphical User Interface (see in section 3.2). To discriminate new and old processor executable it might be preferable choosing a different name for the new version.

To activate the new model, the user shall create a new job and make sure that the new binary is correctly selected for this job (see procedure at section 6.1).
It is also possible to use an existing job and point on the new binary by modifying the job (see section 4.1.1.1). Select the job in the job list and click on 'Modify' button. A panel is displayed where the processor target can be changed.

Once the above is completed, modify the configuration file AUX_CNFOSD/F so that the switch_rough selector is set to 4 (as a new model is added).

To edit this file refer to section 6.2.2 and 6.2.4. Edit the AUX_CNFOSD/F as a text file, search for 'switch_rough' occurrence and change the value of the tag.

Save modifications and process the job.

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APPENDIX A – XML Editor Tool

A. XML editor tool

The SMOS GUI provides an internal XML editor which is able to edit XML documents of the SMOS L2 OS Processor and display it as a JAVA tree component. The purpose of developing and integrating a specific editor is to secure access to data by imposing attributes to the XML tags. Moreover, data inherit attribute values from their close ancestors to the top of the tree.

Note: No DTD (Document Type) document definition is allowed

This editor behaves accordingly to specific preset attributes. We present hereafter the list of predefined attributes and the corresponding effect on the editor.
Note: Any type of attributes may be added to a tag in order to describe the associated data. Only specific predefined attributes allow the performance of specific checks on data value entered by the user.

Example:

```
…
<list_of_IterConf editable="true" count="3">
  <iterConf>
…
    <nMin type="int" range="1,256" description="Minimum number of
measurement to start the retrieval">5</nMin>
    <switch_foam list="true,false" description="Compute foam coverage and
contribution">true</switch_foam>
…
```

In the above example, the variable ‘nMin’ has the type ‘int’ and can be edited (inherited from the ancestor ‘list_of_IterConf’. It is editable, which means that the value can be changed through the GUI XML editor. The value is ‘5’ and any modification can only be ranged between 1 and 256. Beyond this range or if the value is not a integer number, the user is warned with a specific message. The attributes ‘description’ is displayed in the editor and is considered only as static information.

Predefined Attributes

The list of predefined attributes is given below. Please note:

1. that this list is extendable for specific checks. Please contact ARGANS for integration.
2. by default, all the data are editable and of type ‘text’.
3. all attributes and values are written in lowercase

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Attribute	Default Value	Admissible values	Purpose	Example
editable	true	true / false	Allow to edit the next tags data	editable=”true”
type	text	text / double / float / int / file / dir	Impose a type to the next tags data. A check is done to ensure that the data has the imposed type*	type=”double”
list	none	Any list of values comma separated	To impose a list of admissible values. No check is performed in this mode	list=”1,3,5,8”
range	none	Two (2) values separated by a comma	To impose a range of admissible values*. The following check is performed: Vmin ≤ V ≤ Vmax	range= ”2.35,15.45”
fpattern	none	Any string chain	When type is set to “file”, this attribute allows restricting the file search to elements containing the entered string chain. Multiple chains comma separated can be provided.	fpattern=”CONF__” Search will bear on the list of files matching the search condition *CONF__*
fextent	.EEF	Any string chain	By convention, all the definition files are of extension ‘.EEF’. After the file selection, the extension is subtracted from the name.	fextent=”.DBL”

* If the type is ‘file’ the data must be a text string. A selection button is added to the panel in order to select the file from the disk

* If not specified, a default type is imposed to ‘double’ when range attribute is used.

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xmledit	false	true / false	If this attribute is set to 'true', an edit button is added to the interface allowing to open a new XML editor loading the file pointed on (see example below).	xmledit="true"
txtedit	false	true / false	If this attribute is set to 'true', an edit button is added to the interface allowing opening a new text editor loading the file pointed on.	txtedit="true"
description	none	Any string chain	Tag description	description="tag description"
unit	none	All possible units	Unit description	unit="dl"
listdir	none	Any directory to be scanned	If present, create a list of all available subdirectories contained in the tag value	listdir="SMOS_ROOT/ smos_GUI_SSScore/ inputs"
listfiles	none	Any directory to be scanned	If present, create a list of all available files contained in the tag value	listfiles="SMOS_ROOT/ smos_GUI_SSScore/ inputs"

Xmledit attribute example:

```
<iterSchemeFile type="file" xmledit="true">
/data/TDS/inputs/SM_TEST_AUX_ITCOEF_20070101T000000_20781231T235959_0000002
</iterSchemeFile>
```

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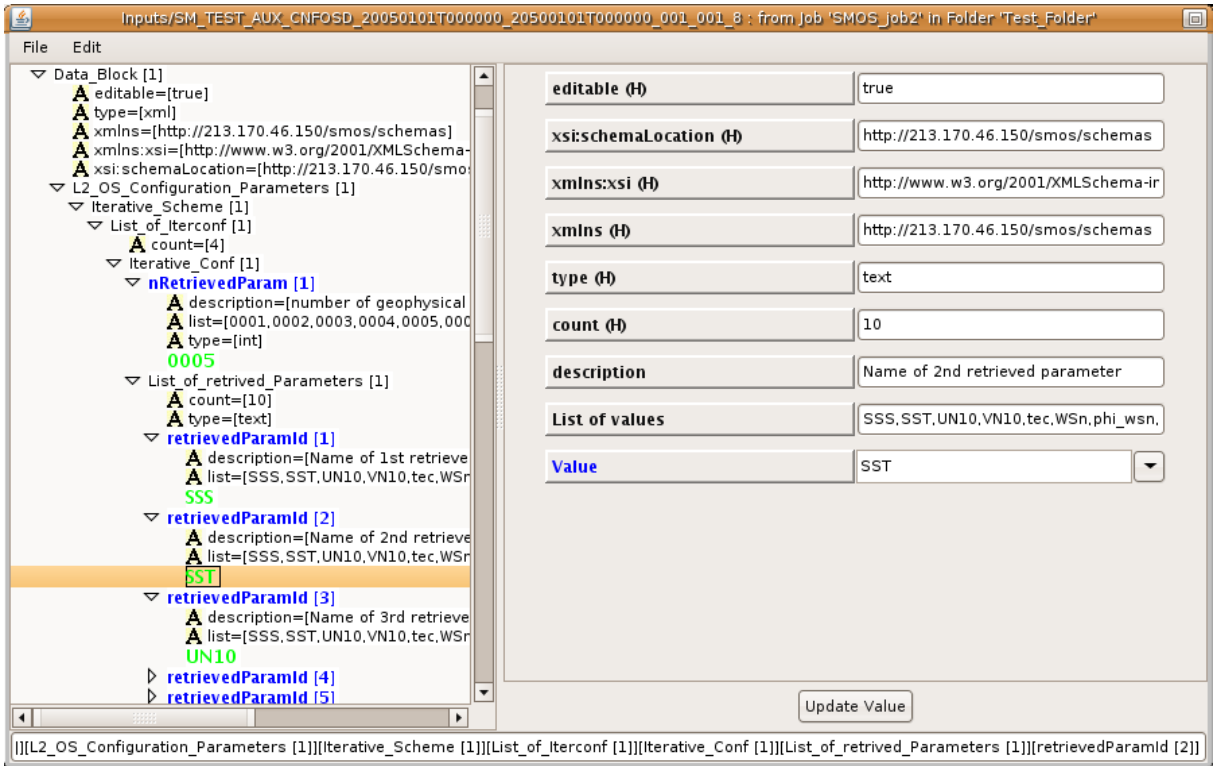
Editor overview



SMOS GUI XML editor example

The above example shows the edition of a XML SMOS configuration file (AUX_CNFOSD). Tree distinct zones are drawn:

- The top menu
  - **File menu:**
    This menu accesses the following command:
    - Save: To save the modifications
    - Export in operational format: To save the file in operational format, that is without any additional tags
    - Close: To close the window
  - **Edit menu**
    This menu accesses the following command:
    - Undo: To save the modifications
    - Find string: (CTRL-F).is useful for finding the tag the user is looking for
    - Collapse: to hide the tree structure
    - Expand all: for a quick access to the attributes and values of the whole hierarchy

- The left panel is dedicated to the whole XML hierarchy from the top to the bottom. Three different icons are used:
  - : this icon denotes that this tag has one or several sons (name is not editable)
  - : no sons are available below this tag. The text associated is the **tag value** (editable by default but can be made not editable)

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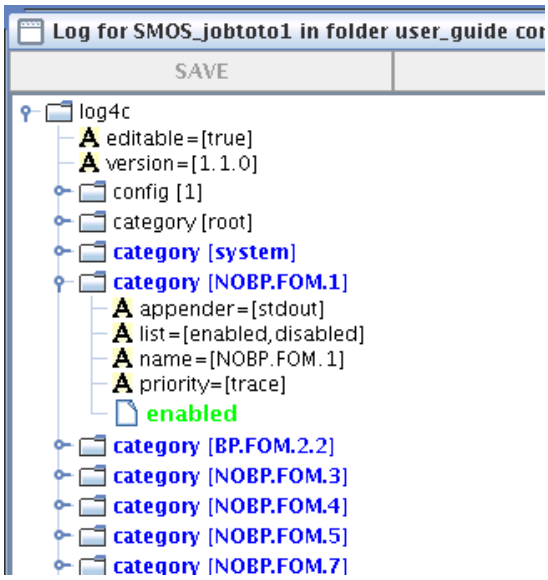
- o A : this icon is for attribute (value is not editable)

The number between square brackets is a counter used to discriminate tags using the same name.



When the attribute 'name' exists, the counter number is replaced with the value of the attribute (see left corner example)

- The right panel is used to display a tag value along with all its associated attributes. The inherited attributes are flagged with a (H).

Note : The editable tags are written in blue. When editable the value associated to the tag is written in green.

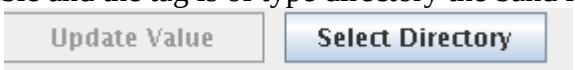
Below the right zone, a button band is available and is dependent on the tag attributes:

- If the value is not editable then the band is changed to :

- If the value is editable and the tag is not of type file the band is :

- If the value is editable and the tag is of type file the band is :

- If the value is editable and the tag is of type directory the band is :



- If the value is editable and the tag is of type file the band and the pointed file is an XML editable file then the band becomes:

- If the value is editable and the tag is of type file the band, the pointed file is an XML editable file and the tag txtedit is set to true then the band becomes:

Clicking on the button 'Edit XML File' will open a new XML editor with the file pointed on by the tag value.

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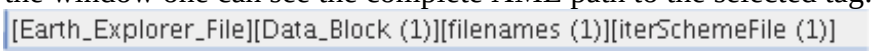
Clicking on the button 'Edit asTXT File' will open a simple text editor able to display xml format. This editor allows modifying the file and save it.
When a value is modified, the button 'Update value' is enabled. The user has to click on this button to update the left panel structure with the newly entered value. Then the option 'Save' located on the top menu 'File' is enabled. To make the change permanent the user has to click on 'Save'.

At any moment an undo is possible through the use of the top Edit menu option 'Undo'.

Note : When the 'Save' option is activated, all the undo history is lost.

At the bottom of the window one can see the complete XML path to the selected tag:



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Appendix B – Feedback Form

The form below is the template of the feedback form. The form is aimed at reporting software problems or at requesting changes in the SMOS L2 SSS Prototype Processor. The forms shall be sent to smos@argans.co.uk.

Feedback form		**Number**	####
Contact Person	Name and institution	**Initiated**	*date*
Level	*low/medium/high/critical*	**Status**	*open/pending/ closed*
Type	*problem/ coherence/ potential improvement*	**Completed**	*date*

Description:
Report in detail the context from which the feedback emerged.

Expected improvement:
Describe improvements expected if the lesson learned from the feedback is applied.

Recommendations for implementation:
List documents, activities, software or data set affected by implementation deemed necessary to obtain the expected improvement. Propose solution(s) and assess workload needed.

Difficulty of implementation	*easy/normal/tricky*	**Reviewed by SMOS project team**	PM-# *date*
Workload	*low/medium/high/hours/days*	**Implementation**	*yes/no*

Justification:
Justify implementation or no implementation.

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